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TRENCHING MACHINE, TRAVELER DUMPING INTO CART

BROOKLYN'S NEW RELIEF SEWER

Required by Increasing Imperviousness of Pavements and Insufficient Run-Off Data Forty Years Ago—
Difficulties in Design—Trenching Machinery and Steam Hammer Driving of Street Piling.

A sewer is now under construction in Brooklyn, N. Y., which is interesting from a number of points of view—from the magnitude of the work, the cost of which will exceed \$1,000,000; from the history of storm water sewerage in the older part of Brooklyn of which this is the culmination; from certain of the details of construction, and from some features of the design.

About forty years ago Mr. Adams, then chief engineer of sewers of Brooklyn, designed a system of storm water sewers on the basis of one-half-inch rainfall an hour with 50 per cent of this running off at once. In view of later experiences this seems absurdly small, but it was in line with the advice and practice of the best English engineers at that time. Within ten years these sewers were found to be altogether inadequate, and a new system was designed to assist these in hand-

ling the runoff, this being based upon the assumption that there would be one inch per hour runoff. On account of defects in the formulas for sewage flow used (Kutter's formula had not yet appeared in English), it is now realized that the sewers would not carry more than .66 of an inch runoff. Most of these sewers ran approximately west and discharged into the East river or New York harbor. Before 1890 it was seen that some heroic measures must be taken to avoid the frequent floods caused by the inadequate capacity of the storm sewers, and what was known as the Greene avenue relief sewer was built, the lower part being completed about 1892, and the extension about four years later. This sewer ran approximately south, crossing the other storm sewers and through a large part of its length at least 10 to 20 feet below them. The old storm sewers

were then modified so that all of the storm water from the shed above the Greene avenue interceptor would be discharged into that interceptor, leaving the original sewers to carry only the dry weather flow and the storm water runoff from the territory west of the Greene avenue sewer.

As is frequently the case, the carrying out of the plans of the Greene avenue sewer did not follow immediately upon its design, and developments on the drainage area having been more rapid than had been anticipated, the capacity of the relief sewer was practically reached by the time it was completed. In fact, immediately after the completion of this sewer, and while a banquet was being served to city officials in the sewer itself to celebrate the event, a sudden thunder storm so filled the sewer that it overflowed at one point the first time it was put in use. Fortunately, the officials had all left the sewer before this happened, warned by those above of the approaching storm. Conditions continued to tax more and more the capacity of the storm water system, and it became necessary to supply another relief sewer to relieve the Greene avenue relief sewer.

Right here it may be said that the officials in charge of the sewer department from time to time cannot be considered open to criticism because of these successive failures of the system. In each case some of the best talent in the country was in charge of the work. The significance of this brief history is that it illustrates the rapid growth of the science and art of sewerage, and also the enormous increase in the runoff of storm water from city areas due to the greater percentage of surface which is covered with impervious pavements, sidewalks, roofs, etc., the more complete imperviousness of the roadway paving and the greater rapidity with which the runoff reaches the sewer because of the capacity and smoothness of channels, gutters, etc.

The increased knowledge concerning rainfall and runoff and the effect also of the changes in municipal construction just mentioned, resulted in the adoption of a runoff rate of $2\frac{1}{2}$ inches per hour for this latest sewer, as compared to $\frac{1}{4}$ of an inch used by Adams. This interceptor, known as the Classon avenue sewer, cuts the Greene avenue sewer at Tompkins avenue in approximately the middle of the area draining into this system; thence proceeds in a general easterly direction to and a short distance up a steep hillside which forms the upper part of this drainage area, there branching to the right and left into two arms which intercept most of the flow from this hillside shortly before it reaches the foot of the steepest portion.

As this sewer passes through streets which already contained sewers and the various pipes and other ordinary subsurface structures of a large city, the Division of Substructures of the city government was called upon for plans showing all of these structures, and most of them were removed to one side of the street or the other before beginning the sewer construction, wherever this was necessary. At one point, in Skillman street, the total width of the street between property lines is but 50 feet, while the excavation for the sewer is about 30 feet. In this case, the house sewers and other structures were placed under the sidewalks, the sewer manholes having heads in the middle of the sidewalk paving and flush with the same. For some distance the sewer runs under an elevated railroad, and provision has to be made for supporting the posts which carry this elevated road.

The sewer has a uniform grade of one foot in a thousand and throughout its whole length. In general it is of basket handle design with the invert having a slope of about 11 inches toward the centre. At a point about a

thousand feet from the outlet the sewer is 17 feet 6 inches wide by 13 feet high. Just below this point the ground falls so rapidly that it is impossible to retain this form of cross section without dropping the hydraulic gradient, so the form is changed to a double sewer with a flat roof; each sewer being 11 feet 3 inches wide, with a 2-foot wall separating the two sewers, and a 26-inch vertical concrete wall on the outside. Near the outlet it is necessary to turn a sharp corner. It had been hoped that property could be obtained for cutting across the corner, but this was found impracticable, and a turn of 123 degrees is made, followed 74 feet further by a 90 degree bend in the opposite direction. The ground still falling, the height of the sewer was reduced and the width increased until the width of each sewer became $14\frac{1}{2}$ feet and the height 9 feet 3 inches. Owing to the excessive span, two partition walls were then introduced making three sewers, which were continued at a height of 9 feet 3 inches and at widths of 12 feet 1 inch, 9 feet $7\frac{1}{2}$ inches and 11 feet 2 inches respectively. These three sewers also continued to widen, until at the outlet they were each 16 feet $9\frac{1}{2}$ inches wide and 8 feet high. At the very outlet a pier of granite is placed in the middle of each of the three sewers, thus dividing the outlet into six openings, and each partition wall is faced with granite. As a further protection at the outlet, a 16-inch oak fender pile is driven with a slight batter opposite each of the seven walls and piers, and 12x12 oak wales are run just above and just below the sewer openings.

All of these changes from one sewer to two and from two to three are made with tapers in walls and roofs adapted to meet the hydraulic conditions with the least loss of head. Granite cutwaters are placed at the upper end of the partition walls. From about mid-depth of the sewer at the end of each partition wall, a half arch is sprung from the cut-water to the roof, acting as a cantilever so as to assist in the support of the roof slab for several feet beyond the point where the base of the wall stops. For instance, where the single partition wall ends and the double partition wall begins, there is about 12 feet of intervening sewer where there is neither one nor two walls, to permit of the readjustment of the filaments of flow; but the roof is supported throughout this intervening space by three semi-arches carried from these three walls in the manner described.

There are a number of other interesting problems which had to be met, many of them due to the existence of sewers in all of the streets, some of which had to be replaced and the sewage cared for meantime, others of which had to be retained and their service made to co-ordinate with that of the new interceptor.

Work on this sewer was let in three contracts, all of which were obtained by the John J. Creem Company of Brooklyn. Some work was done upon the system last fall, but it was not until this spring that active operations got into full swing. Work has now been started at the outlet, where the area for the outlet structure has been enclosed in a large coffer dam, composed of 30-foot 10x10 yellow pine sheet piles, each grooved on each side to receive 3x3 splines. A considerable part of the excavation inside of this has been completed and test piles will soon be driven to determine the depth of a suitable foundation.

The most active construction, however, is to be found at two other points, Skillman street near Myrtle avenue and Tompkins avenue near Lafayette. The work at these two points is being conducted in precisely the same way. A Potter trench machine is used for handling the excavated material, part of which is used in backfilling and part is removed in carts. Most of the

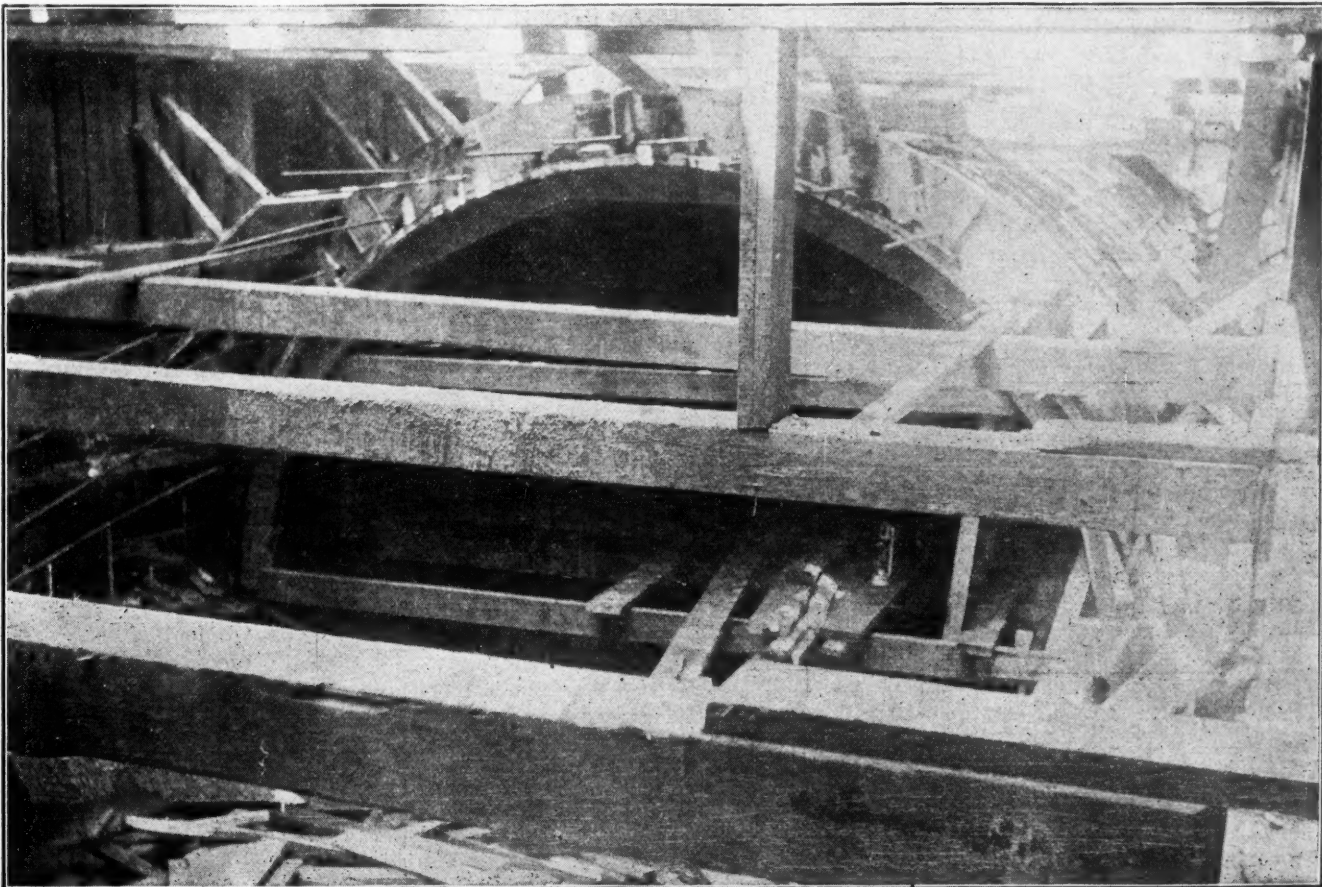
excavation is in sand and gravel, much of which is of excellent quality and can be used for the concrete. The Potter trenching machine consists of a light steel trestle, on top of which are fastened two lines of rails on which travel a carriage or hoist traveller. This trestle is about 250 feet long from the engine just ahead of the excavation to the further end. Cables from the hoisting engine drum in the engine house pass over two sheaves at the top of the traveller and are used for hoisting or lowering two cylindrical steel buckets, each having a capacity of one cubic yard and swung from the suspending handles so as to be dumped readily. The traveller is also moved backward and forward on the track by other cables. Two men ride on the traveller, signalling the engineer for raising and lowering the buckets and for placing the traveller, and also dumping the buckets.

An excavating unit consists of two buckets in the trench and two on the machine. Empty buckets are lowered, the cables disconnected from them and hooked onto the full buckets, these are raised to a chock-a-block condition, when the traveller is run to the point where it is desired to dump the material. In this case a passageway was left under the forward end of the trestle, near the engine house, for two-horse dump wagons to drive under and receive the load from the two buckets. Also, at the rear end of the trestle, a narrow gauge contractor's track was laid back along the trench, on which ran 2-yard side-dump cars which received the dirt from the buckets and carried it back for backfilling. The buckets being emptied, the traveller returns to a gang which has two buckets filled, where it lowers the empties and picks up the full buckets.

On the Tompkins avenue work there were four of these working units. At the head end of the trench were two units or four buckets with 12 men filling them; about 70 feet back from these two buckets and 6 men,

and 70 feet further another two buckets with 6 men filling. In addition, there were in the trench two men trimming the sides and cutting out under the foot of the sheet piling; in all, 26 men in the trench. On the traveller were the two men mentioned, and an engineer in the engine house, making 29 men in all handling the excavation. In addition to these, there were two men operating the steam hammer pile driver (to be described later), and two other men placing sheeting and starting it with the hand maul, together with the other men attending to back filling and odd jobs.

The work during a typical period of 8 minutes was timed as follows: Starting from dumping at the rear end, $1\frac{1}{2}$ minutes later 2 buckets had been lowered, 1 minute later two full buckets had been raised and the traveller started back over a short haul. One minute later the buckets had been emptied and the traveller started back. Thirty seconds later the traveller had stopped and started to lower buckets. Fifty seconds later full buckets were raised, and one minute later both had been dumped into a cart at the forward end. Thirty seconds later the buckets had been lowered into the trench (here 18 feet deep), and 40 seconds later full buckets had been raised; one minute later both had been carried over the long haul and dumped into the cart. This makes 6 cubic yards handled in 8 minutes. A short time afterward the performance was timed again, when 4 yards were handled in 4 minutes and 25 seconds, for two complete cycles. These included in each case some slight delays, such as waiting for a cart which was not in position when the travellers were ready to dump. Also, the superintendent was not present, and no one had any idea that the performance was being watched critically. We were informed later by an uninterested party that quite a little better time was generally made when the superintendent was on hand. The



CENTERING AND FORM FOR CONCRETE, REINFORCEMENT, AND SHEET PILING AND BRACING.

number of men in the trench, of course, is determined by the digging. As stated, the digging here was clean sand and gravel and practically no picking was necessary. The number of men should be ample to fill the buckets in the time it takes the traveller to raise eight buckets, carry them to the desired point, dump them and return them empty. The performance timed gives an average of about 48 cubic yards an hour, or 380 cubic yards a day of eight hours; while from what we could learn and observed, this could easily be speeded up to 450 or even 500 cubic yards a day.

Some time, of course, is required for shifting the trestle as the excavation advances, but in a trench as large as this one, (40 feet deep and about 25 feet wide) it would remain in position at least two or three days, and the shifting could be done at night without delaying the work.

The sheeting of these trenches was out of the ordinary, in that, although the trench is 40 feet deep, the sheeting is driven in one continuous line, rather than driving the upper 14 feet, then starting a new line on the inside of the ranger for a second 14, and driving the last length of 14-foot piles again inside of the rangers. The principal reason for this stepping in of the sheet piling is that the friction of a long plank against the ground and the rangers is so great that it becomes very difficult to drive it to a greater length than 14 to 18 feet. There are, however, two objections to this method. In a wide trench where 12x12 rangers are used, this construction requires that the top third of the trench be excavated 4 feet wider than the bottom of the trench, and the second third 2 feet wider, to allow for the stepping in. Also, there is apt to be a triangular section under each ranger where the stepping in takes place, out of which the dirt settles down and leaves an unfilled space which may give trouble, although this does not seem to us a serious matter.

In this construction, the contractor used 12x12 rangers and braces, and started the first sheeting with 18-foot lengths of plank 6 inches wide, placed and driven by hand to a depth of 6 to 10 feet. The steam hammer pile driver was then used to drive these until they were below the surface, when a 9-foot follower was placed immediately upon the top of each sheeting plank and the driving continued, to be followed by another follower which gave a continuous line of sheeting from top to bottom of the trench. It is not at all probable that this could be done by hand driving, but the steam hammer sent the sheeting down rapidly and without battering or breaking any of the plank, as far as we observed. The friction against the rangers is, of course, considerable, and in order to prevent these being carried down and the possibility of their dropping out and permitting the entire collapse of the trench, a series of short planks set up as posts from one ranger to the next above, and from the bottom ranger to the bottom of the trench, were faithfully inserted as the trench was lowered and additional rangers and braces placed.

The pile driver referred to was carried on a light steel

triangular framed traveller about 15 feet high. This was rolled on wide flat wheels which travelled on a track made of ordinary plank laid on the ground, the whole contrivance being moved along from pile to pile by a pinchbar under the wheel. The pile driver was one made by the McKiernan & Terry Drill Company. Two piles or 12 linear inches of sheeting were driven at one time. The hammer makes about four blows per second, and in the sandy soil of this particular job lowered the two piles at the rate of about a foot per minute. Steam was brought to the hammer by a long line of hose and iron pipe from a boiler.

The sewer at points where construction is now under way is composed entirely of concrete, reinforced across the bottom, and on the intrados of the arch and the extrados of the haunches by $\frac{3}{4}$ -inch steel rods both longitudinally and vertically. The rods are required to be lapped 21 diameters, or about 16 inches. All of the concrete is that known as Class A. The concrete on the invert has a thickness of from 16 inches at the centre to 28 inches at the side walls. The side walls are 2 feet 2 inches thick, and the arch reduces from 2 feet 2 inches at the spring line to 15 inches at the crown. This gives an outside dimension of the sewer of 22 feet in the clear. The concrete is mixed in a batch mixer having a capacity of 17 cubic feet and operated by a gasoline engine; the whole being on a traveller which runs on light steel rails, permitting it to travel alongside and trench and spout the concrete through an almost vertical spout directly to the point where it is needed. About 30 laborers altogether are engaged in handling the concrete aggregate, running the mixer and distributing and tamping the concrete in the trench. For the latter purpose both steel spade tampers and wooden paddles are used. The centres are built up of plank with wooden lagging.

Owing to the fact that the material excavated runs readily, that the sewer walls are carried nearly to the curb line and that the spaces between the sewer and the buildings on either side contain house sewers and a number of other structures, the sheeting, rangers and bracing are left in the trench. Backfilling is done by the cars referred to, the track, for which is carried on top of the trench braces.

The designing and construction of this work has been under the charge of E. J. Fort, chief engineer of the Bureau of Sewers; George T. Hammond, designing engineer, and Arthur J. Griffin, constructing engineer, being in more immediate charge. The resident engineer for the department on this particular work is Frank C. Bates.

ROAD REPAIRS IN MICHIGAN.

The State Highway Department of Michigan is required by law on or before the first of December each year to credit to a repair fund 2 per cent. of the total state aid "rewards" that have been paid up to that time, this amount to be paid to the townships or counties for such repairs as each may have made in accordance with specifications and instructions of the department. This requires that the state highway commissioner prepare a careful set of instructions as to the manner in which highways must be repaired by local authorities, if such authorities are to receive their share of the state repair funds.

These instructions provide that roads of all classes which need resurfacing must be resurfaced during the summer or fall. In addition to surface repairs, all damage to shoulders by washing must be repaired, weeds and brush cut from shoulders and ditches, and ditches and outlets to them be cleaned out if necessary. For earth



STEAM HAMMER PILE DRIVER.

or gravel roads a drag must be provided for each continuous three miles of road, or portion thereof; also for each disconnected piece of road if the distance between the far ends of two or more is more than three miles, but one drag may be used for several disconnected pieces where not more than three miles of total distance must be covered in passing between the extreme ends. "Neither the 4-wheel grader nor the double steel drag requiring four horses to draw will be accepted in lieu of the road drag for this purpose. They are too expensive to operate. It may be necessary, however, to use the 4-wheel grader at times, especially when the frost is coming out of the ground in the spring, to smooth down humps and fill slight depressions which the float will not do after the roads are once thoroughly compacted."

It is required that suitable gravel be piled at accessible points along the highway, equal in amount to 125 cubic yards for each mile of road; a separate pile being placed on each disconnected highway, and not more than 45 cubic yards in any one pile. Arrangements must be made with someone living on or near the improved road to use the drag at the proper times and to spread sufficient gravel to fill hollows and ruts.

On macadam roads all bad hollows and ruts must be filled with No. 2 stone during the wet fall months. Where there is continuous heavy hauling, the ruts must be kept continually filled, so as not to allow the macadam crust to break through at any point. Before the first of December a quantity of No. 2 stone and screenings, in the ratio of 4 tons of stone to 1 ton of screenings, must be delivered and stored at some convenient point on state rewarded macadam roads; not less than 16 tons of stone and 4 tons of screenings for each mile of macadam being required.

In connection with the instructions, there are also suggestions, a few of which are as follows: Filling a rut too full of gravel generally causes two ruts to form in place of one. Gravel patching should be done when the road is wet, preferably when a little water is standing in the hollows, so that the workmen can see just where to place the new gravel. This kind of patching should never be done when a road bed is hard and dry.

Dragging should be begun in the spring after the frost has left the ground, but before it has dried out, and should be repeated after every prolonged rain, and especially in the fall just before the ground freezes. Also drag in the winter if at any time the frost leaves the ground. Never drag a dry road.

Success in dragging depends solely upon the thorough manner in which it is followed up. The telephone should be used to make sure that every man drags his beat on the appointed day.

ULTRA VIOLET STERILIZATION.

The municipal water works of Niagara Falls, N. Y., which was described in our issue of June 26, 1913, has been using hypochlorite as a supplement to rapid filtration. The private plant, which supplies a considerable but smaller portion of the community, was one of the first in the country, if not the first, to use liquid chlorine in routine practice. It now seems probable that the municipal plant will again give that city prominence among water works men by being the first in this country to use ultra-violet rays for sterilization.

We are informed by B. T. Dignan, the chemist of the Water Board, that a plan has been approved for the installation of an ultra-violet ray sterilization plant for the entire output of the water works, which may have been signed before we go to press. The operation of the plant will be under the direct control of the depart-

ment for one year; if not satisfactory, the city will be under no expense whatever.

We understand that continuous expert testing of the results, both chemical and biological, will be made; and there can be no question that the plant will be watched with interest by all who are interested in water purification, and it is to be hoped that the results will be definite and conclusive and such as to be received with confidence in their reliability.

ETHICS IN WATER RATES

A Plea for Equity in Water Rates and for Scientific Rate-Making—Unfairness Resulting from Unscientific Adjustments of Costs.

BY GEORGE A. MAIN, M. E.

It seems axiomatic that a municipal water works should treat all alike—that the costs of the various public and private services rendered by the water works system should be so distributed among those benefited that the charges against any individual shall be directly in proportion to the benefits that individual receives.

The *quality* of the water furnished our municipalities is receiving increased attention, and rapid progress is happily being made along water purification lines. But in this age of trading, no transaction can be deemed complete that fails to take into the account *price* as well as *quality*. Directly or indirectly the individual is paying for all the benefits of the water works. And the individual has the right to the assurance not only that the total receipts from services rendered by the water works shall exceed the total cost thereof by a reasonable margin only, but also that his contributions towards the cost of furnishing fire protection, street sprinkling, and water for schools and other public buildings, etc., have been accurately computed and proven to be equitable, and that in no way has he paid for services received by others.

Yet so irrational have been and are the adjustments of charges for the various water services in hundreds of our municipalities that it is not uncommon to find water rates so schemed that the domestic water consumer is paying several dollars per annum towards the fire protection that some one else is receiving, who is frequently a non-consumer and actually paying nothing at all towards meeting the expenses of the water works.

A conscientious and thoughtful adjustment of water revenues would result in something of a uniformity of practice. Yet so inconsistent are the ordinary charges for water works services that it is difficult to find enough unison to hint even at the possibility of the existence of underlying principles.

An impartial enforcement of any set of regulations does not insure an equitable distribution of costs. To illustrate—domestic water rates are frequently made so high that the revenue therefrom will meet all disbursements. Such rates may be applied without fear or favor, and yet the result be that thousands of dollars are annually taken from the small consumer for water, nominally, which should have been collected from the property owner for the fire protection he has received. It is hardly conceivable that in any city the benefits individuals receive from fire protection, street sprinkling, etc., are proportional to their bills for domestic water. Yet it is only under such a condition that it could be justifiable to collect the total revenue through the water bill. We frequently hear it said with well-meaning pride that the water works of a certain city not only furnishes this or that service free but that the water works is actually turning over to the city certain profits every year. When the patron of that water works pays his water bill he is

paying not only for his water, but also somebody's taxes and paying those taxes in proportion to his water consumption rather than in proportion to the other man's property, income, or acreage.

It is doubtful whether in the case of any commodity the prices are so arranged as to give perfect fairness to every buyer, and in the question of water rates it is not possible to arrive at absolute equity, since conditions are so varied. Yet there are certain underlying principles which, if carefully observed, would correct this, the greatest error now existing in apparently just city finances. The grossness of the injustice of the present careless methods fully justifies a thorough study of the situation.

It is not the intention here to propose a uniform set of water rates. It costs more to procure good water at one place than at another. And, too, there are many points on which men naturally differ. One manager may think that the patron should own the water meter—while another would have the city own all meters. Obviously, no one set of water rates could justly apply in both the above cases, for in the latter case the city must receive additional revenue to meet interest and depreciation on the meter, while in the former case such a charge would be unfair. Similarly in the matter of service repairs, if cost of repairs are included in an annual minimum charge it must certainly be larger than if the patron meets the cost of repairs as they are required.

In the case of every water works there are two recognized divisions of services rendered—public service and private service. There may not be entire agreement as to where the dividing line comes between these two classes of services. For example, there are many cities where street sprinkling is treated as a private service, and billed only against the individual where street sprinkling is done. But in any given case there need be no question as to the division point between the public service and the private.

A fundamental principle applicable here is that these public and private services should be paid for separately and in proportion to their respective costs. One essential, therefore, is to ascertain the proportion of the plant which is devoted to the public service and the proportion to the private service. Competent investigators have found that the investment necessary for furnishing the public with their several services varies from 25 per cent of the whole investment in water works system in the case of the large cities to 75 per cent of the whole investment in the case of the small cities.

In many cities the interest on the funded debt is met from public funds, this being the only expense in connection with the water works that falls on the public. This is generally less than should be paid from the public treasury. But the real absurdity of leaving this method as an equitable adjustment of fire-protection costs, etc., is apparent when it is recalled that the bonded debt generally decreases every year, while the value of the water works is, without additional bonds, annually increasing through the continual extensions.

Having ascertained in any particular case the proportions of the investment required for the two classes of service—public and private—the interest and depreciation on each of these portions should be computed and entered against the respective revenue accounts. To these items of expense must be added the current expenses of operation, repairs, etc., carefully computed from known facts in order to place against the public and the private patron their just portions of the costs.

The simplest method of raising the revenue to meet the public's share of the costs seems to be direct taxation in proportion to property valuations. However, it is imperative—from the point of view of fairness—that the

charges be equitably apportioned, and it should be a matter of careful study to determine the correct basis for charging for fire protection, street sprinkling, sewer flushings, etc. Foot frontage should have a bearing on the bill for street sprinkling, nearness to hydrants on the collection for fire protection, and number of occupants on the value of sewer flushing services.

Having arrived at a just apportionment of the total cost of water services for each of the two primary divisions—public and private—and an equitable distribution of the cost of public service, it is equally important that the total revenues from private services be so adjusted as to treat all impartially.

In arriving at fair rates for private water service there seem to be two essential parts and only two parts to every just water bill—a service charge, and a charge for the water consumed as determined by meter or estimated. Every item of cost connected with furnishing a private water supply may be included under one or the other of the above items. Furthermore, what is still more important, no item of cost need enter a bill made out as above that does not belong there; this being the most common fault in water bills.

This service charge, or "readiness to serve charge," as it is sometimes called, or better still, "service maintenance" charge (for that is what it really represents) is, roughly, a rental on whatever property the water works places at the exclusive use of the patron. In detail it should be sufficient, and sufficient only, to cover interest and depreciation on corporation cock, goose neck, pipe, fittings, curb cock, service box, or such portions of these as are furnished by the water works; the average cost of all service repairs (not otherwise paid for), reading meters, making out bills, and collecting bills; and finally the average amount of unrecorded water which passes through meters, not only at times of small and hence unrecorded leaks but also water lost while meters are out of repair, not placed on bills as estimated consumptions. In fact, the above computed charge for "service maintenance" should cover all private water service costs except the item of water consumed. From this computed service maintenance charge should be deducted interest on deposits made by consumers as a guarantee of payment of future water bills, in order to arrive at the correct and true maintenance charge.

Having provided a just service rental charge, it should be left to the consumer how much water he desires, just as it is left to him how much of anything else he purchases. The amount of the other item of the fair water bill is absolutely in proportion to the amount of water shown by the meter or otherwise ascertained. This item on the bill reads—so much water at so much per unit quantity—regardless of the quantity used. In the case of the municipal plant the water is sold at cost—and surely it should not be sold at *less than cost* to any one.

A concrete illustration, showing how the somewhat common but unfair method of billing, known as the minimum allowance plan, was modified, will emphasize the equity of the above, which is in principle the only equitable plan of billing for water. The water works in question had established a minimum charge of \$2.50 per quarter for which twelve thousand gallons of water were furnished. Excess water was billed at nine cents per thousand gallons. The family that required only six thousand gallons per quarter paid the same for it as the family which received twelve thousand gallons—an obvious injustice to the smaller family. Without materially affecting the total revenues and without working any injustice on any one, the rates were re-adjusted as follows: A service maintenance charge of \$1.25 per quarter was billed against all consumers sup-

plied through $\frac{3}{4}$ -inch services. Water was bill at ten cents per thousand gallons recorded by the meter. Twelve thousand gallons now costs \$2.45 per quarter, instead of \$2.50, as was the case before. Six thousand gallons costs \$1.85 per quarter. Everybody pays the cost of maintaining the service plus the cost of the water—these are all they get and are all they should pay for.

It is not to be expected that the ideal condition will ever obtain in the matter of water rate adjustments. It is indeed rare in any business. Absurd limiting legislation in some states prevents equitable water rates. There is, however, no excuse for many of the extremely inequitable existing rates, and a campaign of education and ethics should be started. There is every reason to believe that thoughtful study of this interesting and far-reaching problem will in almost every case result in genuine improvement in water rates to an extent which will amply repay the cost, whether the investigation be in the large city or in the small one.

It is to be hoped that the Public Utility Commissions and others in positions of influence will make united attacks on this evil of unfair water rates with the aim of ultimate uniformity as regards the principles on which rates are based and universal equity.

EUGENE'S POWER, WATER AND LIGHT PLANTS

Municipal Hydro-Electric Power Plants Furnishes Current for Street and Commercial Lighting and Power for Pumps—Establishing Water Rates

Eugene, Oregon, has for three years operated municipally owned hydro-electric power and water works plants, and has constructed in the past couple of years a street lighting system, a commercial lighting system and improvements to the water system. The municipal power plant now furnishes about 500 k. w., which is less than one-third of its capacity. Since the sale of municipal power began, the maximum lighting rates have fallen from 15 cents per k. w. hour to 9 cents. The municipal water system also has given much better water at a very low cost.

A charter amendment passed in 1908 authorized the sale of \$300,000 worth of bonds for the purchase or construction of a water works system. In the fall of 1908, the existing water works plant was purchased from the Willamette Valley Co. for \$140,000. Extensive investigations of various projects for improving the system were made, and it was concluded that pumping and filtration was the most feasible, and in 1909 and 1910 the filter system and power plant were constructed. It was estimated that the filter plant would cost \$60,000 and the power plant \$160,000.

The site of the proposed power plant was on the McKenzie river, a tributary of the Willamette. Along its upper part, this stream, rising in Clear Lake, flows through the foothills of the Cascade Range and is deep and swift, but in its lower course through farming lands it becomes broad and shallow. Owing to the character of the stream no dam was necessary at the intake point, which is located on the north bank of the river 18 miles east of Eugene. The intake is 60 feet wide and is protected on both sides by piling, faced with plank and backed with rock and brush. A heavy double log boom affords protection against logs and other drift.

The head gates are about 350 feet below the intake and are of concrete construction throughout. They are set on a foundation of hardpan gravel, no rock founda-

tion being attainable. Provision is made to prevent undermining. A hand-operated winch and bevel gears are used to operate the gates.

From the headgates, the water flows through a canal 19,400 feet long. With the exception of one or two places, the canal runs through a gravel formation. The bottom width of the canal is 20 feet, the side slopes are $1\frac{1}{2}$:1 and the fall is 2.11 feet to the mile. At the end of the canal is a flume 650 feet long, 10 feet wide and 7 feet deep. The flume has a fall of 1 foot per thousand, with the exception of the first forty-eight feet, which has a slope of one foot in a hundred. The forebay, like the flume, is constructed of $2\frac{1}{2}$ -inch tongued and grooved lumber, dressed on both sides. It is 74 feet long, 24 feet wide and has a depth of 11 feet. Water is conducted from the forebay to the power house through two wood stave pipes, each 100 feet long and 96 inches in diameter. The penstocks are composed of 4-inch stock dressed to $3\frac{1}{2}$ inches and banded every 6 inches with $\frac{3}{4}$ -inch steel. The pipes are bedded on timber cradles placed 12 feet apart. Just before entering the station, each pipe branches into a 96-inch steel "Y," which carries the water to the turbines. The head is 28 feet and the draft 15 feet, a total head of 43 feet.

The generating plant consists of two units, each made up of a 1,200 h. p. Pelton make Francis type turbine direct connected to a Fort Wayne alternator. This gives a continuous horsepower of 1,875. Energy at 23,000 volts is transmitted over 15.5 miles of wood pole line. Westinghouse equipment is used throughout for switchboards, transformers and lightning arresters.

Power is distributed about the city at a voltage of 2,300. The business streets are lighted with 5-light posts, carrying four pendant 60-watt and one vertical 100-watt lamps. The pendant lamps are turned out at midnight, but the 100-watt lamps burn all night.

The municipal water works system is located on the banks of the Willamette river about one-half mile from the center of the city. The total capacity of the plant is three million gallons per day. Electricity from the municipal power plant is used for driving the pumps.

The water is pumped from the river into the settling tanks, filtered into a clear water well and then pumped into the mains. The intake is on the south side of the river and about 300 feet from the pumping plant. A 12-inch pipe line connects the intake to a Gould pump, belted to a 50 h. p. motor, which can raise 3,000,000 gallons 20 feet in 24 hours, or a correspondingly less amount in periods of low water, when the lift is greater than 20 feet.

This low-lift pump discharges into four settling tanks, each 20 feet in diameter and 20 feet high; the water, before it reaches these tanks, being treated with sulphate of alumina. The quantity of the chemical used is determined by the condition of the river water, tests of which are made three times a week, or oftener if necessary. After remaining in the settling tanks for from 5 to 8 hours the water flows by gravity to the filters.

The filtration plant, which is of the type known as the Jewell subsidence gravity filter, is located in a separate building. There are four separate circular tanks, each having a surface area of 227 square feet and a capacity of 750,000 gallons in 24 hours. Under ordinary conditions the filters are washed once a day. Clear water is forced through while an electrically-driven agitator is stirring up the sand.

From the filter beds the water flows to the clear water well and from there is pumped into the mains by three Gould pumps direct connected to 50 h. p. electric motors and each having a capacity of 1,500,000 gallons in 24 hours. This plant was turned over to the water board

TABULATION OF CALCULATIONS FOR ADJUSTMENT OF WATER RATES.

I

Apportionate Values of the Physical Property of the Eugene Water Works.

| | Total | Public | Private |
|--|--------------|-------------|--------------|
| Pumps and Piping Connections..... | \$ 12,573.04 | \$ 6,286.52 | \$ 6,286.52 |
| Motors | 2,967.50 | 1,282.75 | 1,684.75 |
| Transformers and Wiring..... | 1,420.00 | 710.00 | 710.00 |
| Filters, Wells and Settling Tanks..... | 22,983.51 | 2,000.00 | 22,983.51 |
| Buildings and Grounds..... | 5,767.11 | 3,767.11 | 2,000.00 |
| Meters | 4,322.48 | 4,322.48 | |
| Mains and Distributing System..... | 69,955.84 | 34,977.92 | 34,977.92 |
| Low Service Reservoir..... | 2,077.25 | 2,077.25 | |
| Stores | 200.00 | 100.00 | 100.00 |
| Totals | \$122,266.73 | \$45,357.19 | \$76,909.54 |
| Per Cent..... | | 37.1 | 62.9 |
| Useful Operating Property..... | | | \$122,266.73 |
| Useful Non-operating Property— | | | |
| Pipe Fittings..... | | \$ 178.50 | |
| Well across river..... | | 2,619.70 | |
| Steam Pump..... | | 1,633.00 | |
| High Reservoir..... | | 16,772.40 | |
| Pipe across river..... | | 674.15 | |
| Real Estate..... | | 82,855.52 | |
| Bonded Indebtedness..... | | | \$104,733.27 |
| | | | \$227,000.00 |

II

Separation of Operating and Maintenance Expenses of the Eugene Water Works Into Capacity and Output Expenses for Aug. 1, 1911, to Aug. 1, 1912

Pumping Plant

| Item. | Total | Capacity— % Amount | Output— % Amount |
|----------------------------|-------------|-----------------------|---------------------|
| Gen'l Office..... | \$ 1,070.73 | 80 | 20 |
| Elec. Energy | 11,765.72 | 10 | 90 |
| Pumps | 295.61 | 10 | 90 |
| Motors | 114.80 | 10 | 90 |
| Transformers, etc..... | 10.12 | 10 | 90 |
| Filters | 92.93 | 100 | |
| Chemicals | 1,070.80 | 10 | 90 |
| Oil and Waste..... | 205.29 | 10 | 90 |
| Buildings and Grounds..... | 75.32 | 100 | |
| Insurance, Etc..... | 130.00 | 100 | |
| Miscellaneous | 31.23 | 5 | 95 |
| Operating Labor | 2,321.62 | 70 | 30 |

Distributing System

| | | | |
|--------------------------------------|-------------|------|-------------|
| Gen'l Office | \$ 1,375.04 | 80 | 20 |
| Business Promotion | 75.00 | 100 | |
| Collecting Revenue..... | 1,402.28 | 100 | |
| Meters | 291.25 | 80 | 20 |
| Mains | 837.01 | 100 | |
| Miscellaneous | 3.45 | 100 | |
| Right-of-Way | 2.90 | 100 | |
| Reservoirs | 25.00 | 100 | |
| Total Operation and Maintenance..... | \$21,196.10 | 29.8 | 70.2 |
| | | | \$14,865.96 |

III

| Expense | Total | Capacity— % Amount | Output— % Amount |
|-----------------------|-------------|-----------------------|---------------------|
| Operating | \$21,196.10 | 29.8 | 70.2 |
| Interest | 11,485.00 | 3,422.53 | 8,062.47 |
| Sinking Fund, 6%..... | 13,620.00 | 4,058.76 | 9,561.24 |
| Totals | \$46,301.10 | 29.8 | 70.2 |
| | | | \$32,489.67 |

IV

Analysis of Pumpage and Consumption for Aug. 1, 1911, to Aug. 1, 1912.

| | | |
|---|-------------|--|
| Private Consumption— | | |
| Metered | 26,000,000 | |
| Unmetered | 174,000,000 | |
| Public Consumption— | | |
| Street Sprinkling | 2,860,000 | |
| City Hall | 94,000 | |
| Sewers and Fountain | 32,120,000 | |
| Fire (Cleaning Reservoir)..... | 8,000,000 | |
| Consumed in Operation— | | |
| Washing Filters | 14,400,000 | |
| Flushing Mains | 10,000,000 | |
| Washing Reservoirs | 2,000,000 | |
| Wasted Flushing Sewers, now prevented..... | 54,000,000 | |
| Lost, not accounted for | 44,000,000 | |
| | 124,400,000 | |
| Total Pumpage | 367,474,000 | |
| From the above table the relative percentage of consumption is determined as follows: | | |

V

| | | |
|---------------------------|-------------|-------|
| Private Consumption | 200,000,000 | 82.3% |
| Public Consumption | 43,074,000 | 17.7% |
| | 243,074,000 | 100 % |

VI

| | PUBLIC | PRIVATE | Total |
|----------------------------|-------------|-------------|-------------|
| Capacity Expense | 37.1 | 62.9 | \$13,811.43 |
| Output Expense | 17.7 | 82.3 | 32,489.67 |
| Totals | \$10,874.71 | \$35,426.39 | \$46,301.10 |
| Taxes | 1,898.19 | 1,898.19 | |
| Annual Apportionment | \$8,976.52 | \$37,324.58 | \$46,301.10 |
| Annual Revenues | 1,200.00 | 30,309.74 | 31,509.74 |
| Deficits | \$ 7,776.52 | \$ 7,014.84 | \$14,791.36 |

on March 11, 1911. In 1912 a Jeansville turbine pump of two million gallons capacity was added.

There are at present two reservoirs, both of concrete. The smaller one, with a capacity of 225,000 gallons, is used in connection with domestic service, but the larger one, with a capacity of two million gallons, gives a pressure too high for ordinary domestic use, and is connected up to the system only in case of fire.

The cost of the power plant, including extensions made to the end of 1912, was \$263,521, of which the largest items were \$90,171 for the canal, \$10,604 for the flume, forebay and wasteway, \$25,656 for hydraulic apparatus and pipe lines, \$22,097 for electric apparatus, \$12,164 for transmission and telephone line, \$22,419 for transformers and lines, \$25,000 for street lighting, including ornamental posts, \$12,164 for real estate and rights of way. To this is added \$20,755 for bond expense and interest during construction, giving a total cost of \$284,276.

The filters, wells and settling tanks of the water works are valued at \$22,984, the mains and distribution system at \$34,978, and the low service reservoir at \$2,077.

In order that the water power plant may attain its greatest efficiency, it is desirable that the load be as uniform as possible, and the pumping station load is regulated so far as possible so as to use its greatest power when the other loads are light, the equalizing effect of the reservoirs being used to permit this.

The street lighting equipment consists of two 20 h. p., 6.6 ampere regulators, which operate the street lights through two circuits. The plan is to cover the city with at least one 100-watt series tungsten lamp at each corner, and more than thirty miles of streets are lighted by this system. Most of the lamps are suspended from pipe brackets on poles at the street intersections at a height of about 15 feet above the curb.

The commercial service is furnished by two 2,300-volt three-phase circuits through overhead wires. The standard secondary voltages are 230 for motor service and 115 for lighting.

ESTABLISHING WATER RATES.

The most interesting feature of the municipal water works plant is the method of establishing rates. A system of accounting has been carried on covering the various expenses of the department, and a careful investigation made into the expense of the department with a view to a proper adjustment of the rates in accordance with rules and methods used by the Wisconsin Public Utilities Commission. The physical property is evaluated and divided into hypothetical portions according as the service is for the benefit of the public or of the private consumers. Similarly the operating and maintenance expenses were apportioned. The results of this apportioning are shown in the accompanying tables:

The classification of the high reservoir as useless, non-operating property is made because it is for public service only, and since the maintenance and depreciation are practically nothing, it is considered that the interest charge thereon is, as with the balance of non-operating property, not fairly chargeable against the water consumer but against the city as a whole.

Likewise, the expense for the utility may be divided into a portion which is or should be incurred independent of any expenses of actually furnishing water, and the actual expense in furnishing water. For example, as shown in table II, 29.8 per cent of the entire operating expense would be incurred if no water were pumped at all.

The interest and sinking fund are divided in the same

ratio as that determined for the operating and maintenance expenses, from which table III is calculated. Careful investigation of the water consumption was made.

The amount of water used in washing filters was measured by weir; that used in flushing mains, by measuring the discharge of each hydrant under normal conditions. When the investigation was started it was found that water was being used for flushing sewers, etc., at a rate exceeding 96 million gallons a year, but this was at once reduced to a 32 million gallon rate and later to a much less amount. Since the large reservoir is held for fire purposes only, the water used for cleaning it is charged against the fire department.

On the basis of this investigation of consumption and pumpage, the figures in tables IV and V were calculated. Finally table VI was based upon the results of the previous tables, showing that during the year covered by these figures there was a deficit of \$7,776 in the public service and of \$7,015 in the private service.

"The operating output cost per thousand gallons of

\$14,865.96

water pumped is seen to be $\frac{14,865.96}{367,474,000} = 4$ cents approxi-

367,474,000

mately, although the total operation cost per thousand

\$21,196.10

gallons pumped is $\frac{21,196.10}{367,474,000} = 6$ cents, and 2 cents of

367,474,000

this is capacity expense and would have to be borne by the department, if no water was pumped.

"If, therefore, the department seeks to economize by reducing the total pumpage, we will find that such reduction will result in a saving at the rate of 4 cents per thousand gallons.

"A study of Table VI shows that a corporation furnishing water in the city of Eugene, under like conditions, would be allowed by a public utility commission to collect annual revenues from the city of \$10,874.71, and from private consumers \$35,426.39, plus a profit on the investment amounting to not less than \$12,500 annually.

"This is further shown in the various decisions of public utility commissions in which corporations operating in cities are allowed to demand from the city alone from \$1 to \$2 per capita for services similar to that of Eugene. An average illustration may be given in the case of the city of Beloit, Wis., a city of about the same population as Eugene, which was ordered July 19, 1911, by the Wisconsin commission to pay the corporation operating therein \$15,000 annually. The actual water furnished in this case was valued at about \$300 per annum, and the balance of the charge was made up of investment and capacity charges for fire demand alone.

"From deficits it is seen that the city is far from paying its just share of the annual expense which it is properly chargeable with.

"Municipal enterprises, however, are usually allowed the benefit of taxes in order to divide the burden of expense equitably between the water consumer and the taxpayer. The water consumer is not necessarily a taxpayer. Following this plan the city should be allowed a credit for taxes on the assessable value of the system, which would amount to \$1,898.19, and the private consumer should be charged with this amount, making the actual amount which the city should pay for water annually \$8,976.52, and the amount private consumers should pay \$37,324.58. The final adjusted deficits would then stand: City, \$7,776.52, and private consumers, \$7,014.84.

"The elimination of these deficits and the placing of the system on a self-supporting basis involves a careful

study of the entire situation concerning each element where economy can be obtained."

The water board considers that the department should be relieved of the useless non-operating property with which it has been charged, as shown in Table I, which would permit a material reduction of the total annual expense. This reduction, however, would be partly offset by improvements which are necessary for rendering adequate and proper service.

The charter amendment under which this plant was built provides that the revenues be used for the operating expenses and repairs; the payment of interest on bonds, and of the bonds themselves; for the accumulation of a sinking fund, the annual payments to such fund to be $2\frac{1}{2}$ per cent of the then outstanding bonds; and finally for making extensions to and improvements on the plant.

The entire control of the plant is vested in the commission known as the Eugene Water Board, composed of five freeholders of the city, who serve without pay. The water board, from whose report the above description is taken, consisted of M. Svarverud, president, E. U. Lee, vice-president, R. M. Day, B. B. McKinney and C. S. Frank. This board is certainly to be congratulated upon the thorough, scientific and businesslike way in which they have undertaken to discharge their duties. The board credits the University of Oregon, and especially Professors Stafford and Sweetser and their assistants, with a share of the credit for these results, in that they have, without remuneration, conducted continual tests of the water, and in other ways assisted the board.

DIGGING A RESERVOIR WELL.

After several years of trouble with drilled wells as the source of water supply, Robinson, Illinois, determined to test out a reservoir well, that is, a reservoir into which water enters under its own head. A test well showed that water was present in a coarse gravel formation at a depth of 18 feet and that this formation was 83 feet thick. The necessary machinery was secured, including a boom derrick, hoisting engine, dump and clam shell buckets.

In a former attempt to dig a well of this sort, a flat board shoe had been used as a foundation on which to start the brick wall. Difficulty had been encountered in the use of this because, having no sharp edge, it made slow progress after reaching water. The foreman therefore decided to use a shoe with a sharp edge in the present case. To do this, a form was made twenty-five feet in diameter, sixteen inches wide at the surface and thirty inches deep, tapering to the outer edge at the bottom. This made a circular form with the cross-section in the shape of an inverted right triangle. Around the outer edge was placed $3/16$ -inch by 36-inch boiler plate, perforated to permit the use of eye-bolts. Through these eyes were passed $5/8$ -inch messenger wire to make fast to the outer shell and to reinforce the concrete that was poured into the form. A 14-inch brick wall, laid in cement mortar and plastered outside to keep the water out, was started on this shoe. Provision was made for securing anchor rods in this to extend up through the wall for the purpose of holding shoe and wall together in case the shoe should, in a soft formation, have a tendency to face away from the wall.

The wall being started, excavation was begun on the inside and the dirt taken out by a dump bucket. With the excavation from under and the weight of the wall on top, the shoe was easily started. The wall was battered $1/2$ -inch to the foot. If more than that batter is

used, the wall is liable to move from an upright position, in case one side of the shoe strikes an obstacle. Care was taken to start the shoe evenly, as it was found to be almost impossible to straighten it after an uneven start.

Upon reaching the water-bearing gravel, the dump bucket was abandoned and the clam shell used, as the water came in at a rate that made it impossible for the men to work inside. In the meantime, the bricks were being laid, thereby increasing the weight on the shoe as the depth increased. After excavating ten feet in the gravel, it was decided that a sufficient depth had been attained. The well was then tested and water was drawn off for two hours through an 8-inch pipe. The water could not be lowered below a certain point. For the past three years the well has furnished all the water needed both by Robinson itself and by another nearby city having a population of 3,000.

DETECTING LEAKS IN DEEP WELLS BY ELECTRIC LIGHT.*

The city of Galva is situated on the divide between the Illinois and Mississippi Rivers. The city draws its water supply from the St. Peter sandstone, which is found at a depth of 1,381 feet, and the wells are drilled to depths of from 1,477 to 1,525 feet. The log of the wells is as follows:

| | Depth. |
|--------------------------|-----------|
| Soil and clay..... | 62 |
| Coal measures | 455 |
| Niagara limestone | 882 |
| Utica shale | 1030 |
| Hudson River shale..... | 1055 |
| Trenton limestone | 1381 |
| St. Peter Sandstone..... | 1475-1525 |

A study of the logs of wells shows that the St. Peter stratum falls fifteen feet per mile from Rockford to Galva.

When the wells were first drilled, about twenty years ago, the water rose to within 150 feet of the surface, but for some time it has stood at 240-246 feet. The pump cylinders are 300 feet below the surface and are always covered with water. The well is cased for 110 feet with 12-inch tubing and below that level is cased with 9-inch tubing to the bottom. The joint between the casings is of lead.

In 1906, the quality of water in the wells seemed to have changed and it was thought that a leak had developed in the casing. The pump was taken out and a cluster of three electric light bulbs was lowered into the well. The lamps were connected by a long wire to the lighting circuit, and were provided with a shade above. The lowering of this light into the well was followed by the aid of a field glass. It was found that water was entering through a leak in the casing at the lead packed reducing joint, 110 feet below the surface of the ground. This was repaired.

There were indications of another leak in the casing in 1911 and the above process was repeated. It was found that a leak had developed again in the lead joint.

The cause of failure in the casing at this point is probably explained by the continual vibration of the earth, which is brought about by the running of heavy trains on the main line of the railroad, only one hundred feet away, and by the jar of the pumps. The upper strata are of soft water-soaked material. The pump and heavy masonry base are fastened to the top of the casing and the result is a rather top-heavy structure. The vibrations tend to break the casing at the weakest point.

*Paper by Lloyd Z. Jones, City Engineer, Galva, Illinois, before Illinois Water Supply Association.

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JULY 30, 1914.

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Establishing Water Rates.

Much has been said in papers before water works associations, in reports to municipalities, in technical papers and elsewhere concerning a correct and logical method of establishing water rates; the ideas advocated being generally familiar to the readers of Municipal Journal. In these, a large part of the emphasis has been laid upon the method of making the charge to the consumer, the general idea being to divide this into two parts, one being practically a ready-to-serve charge, the other a direct and uniform charge for the amount of water actually consumed.

There is another point of view, however, which is now demanding attention—the total amount which should be raised by water rates from the private consumers and that which should be drawn from the municipal treasury as the contribution of the city at large.

The work done by the Wisconsin Railroad Commission is probably the most important contribution toward the proper decision of this question which has been made by any body of men or individual, and the decisions of this commission are being generally accepted as fundamentally correct, although there may exist disagreements with some of their minor points.

In an article appearing elsewhere in this issue, the author has explained the principles which should un-

derlie any system of water rates; while in another article is described the way in which these principles were applied to the concrete case of the water works finances of Eugene, Ore.

The calculation in the case of Eugene may appear to be somewhat complicated, and in certain respects by no means an exact science; but the labor involved is small when compared with the importance of the result aimed at, while even with the approximations and the minor inaccuracies of some of the hypotheses, the results are vastly more equitable and logical than the almost absolute lack of method or of the use of any basic principles employed in the preparation of water rates heretofore.

The idea until very recently appears to have been to raise sufficient money to carry on the plant, getting what can be obtained from the city treasury and then raising the rest by water rates; which rates are not regulated by equity but have been determined by the influence which manufacturers may have, frequently securing water at less than cost, and the desire of the officials to avoid as much unpleasantness as possible and therefore to put the highest rates on those who in the long run do the least objecting.

There are, of course, some arguments on the other side, but in general there would seem to be no good reason why each consumer should not be charged for just what he gets in the way of service and no more. To do otherwise would be as discriminating as to use various standards of assessment as a basis for taxation—a practice which sometimes exists but we believe has never been defended.

Mosquitoes and Water.

In spite of all of the education which has been given through the columns of the press and technical papers concerning the mosquito, there are still a large number of generally intelligent citizens who insist that water is not necessary for breeding mosquitoes, but that they not only live but also breed in high grass and shrubbery. We have even heard unusually intelligent men claim that if mosquitoes are to be gotten rid of, the town should require every owner of vacant land or other real estate to keep the grass cut and to remove all shrubbery which harbors mosquitoes.

There have undoubtedly been some minor mis-statements made in connection with mosquitoes in the past, one of these being that a mosquito never travels more than a few hundred or thousand feet from the point where it was born, it now being known that certain varieties of mosquitoes travel or are blown long distances. But there does not seem to be a possibility of a doubt of the fact that mosquitoes will not breed except in water existing under favorable conditions, and that if all of these conditions could be removed, the mosquitoes would in a few months be entirely exterminated. The certainty of this lies in our knowledge of the life history of the mosquito. Every mosquito during its early life is a "wiggler," which lives in water and cannot live anywhere else, and mosquitoes never come directly from eggs but have to pass a certain early part of their existence as an inhabitant of water.

To many it may seem entirely unnecessary to have repeated these statements which are so common and well known to all, and yet there are many intelligent citizens, including city officials, which are not yet persuaded that by eliminating water breeding places mosquitoes can be gotten rid of. A mosquito can no more come to life on dry land than a frog can without going through the tadpole form of existence.

The WEEK'S NEWS

Widespread State Work in Pennsylvania—Preliminary Work of Indiana's New Highway Commission—Testing Glutrin and Wood Blocks—Typhoid Epidemics Begin—Metering in Newark—Enlarging Many Supplies—Philadelphia's Lighting Situation—Rebuilding Salem—Commission's Good Showing in Topeka—New York's Big Piers—Signboard Revenue.

ROADS AND PAVEMENTS

Pennsylvania Begins Work with Auto Fees.

Harrisburg, Pa.—With 3,000 men at work repairing the roads, the state highway department has made a start in the last few days toward utilizing the fund derived from the taxation and registration of automobiles. More men are to be put to work all over the state, and the emergency repairs are being pushed as rapidly as possible. Payments have already been made to the State Highway Department for construction and repair of highways from \$1,125,000 of automobile licenses which has accumulated in the State Treasury since January 1, and which has been in controversy between the fiscal officers and the Highway Commissioner of the State. Auditor General Powell stated that the balance available for the Highway Department as of July 1, 1914, including all of the 1914 automobile licenses, amounted to \$3,380,000 in round numbers. This is the total of a variety of items appropriated by the Legislatures of 1911 and 1913, including salaries, expenses, main highways, State aid highways, national road and other objects. Night letters were sent by Commissioner Bigelow to every district engineer and county road superintendent in the State directing them to start work with road drags on the next day on the worst stretches of roads in their territory and to prepare to put forces of men to work on State highways, State aid roads and bridges and culverts within the next few days.

No attempt has been made to begin resurfacing work and none will be made until the more important general repair work has been accomplished. S. D. Foster, chief engineer of the State Highway Department, has directed that initial repairs, including the filling of holes, cleaning out of ditches, culverts and gutters and general shaping up and rolling of the highways, be completed before any further detailed work is started. The work now being carried on is under charge of the maintenance division, of which George H. Biles is the engineer in charge. The maintenance division has available a balance for State-aid maintenance of \$85,741.51.

In Clearfield, Center and Indiana counties work of this nature, aggregating nearly \$11,000, has been authorized by the maintenance division to date this year. In Armstrong, Butler, Clarion, Jefferson, Lawrence, Mercer and Venango counties \$29,000 has been authorized. In Franklin and Fulton counties more than \$15,000 has been needed. In Bedford, Blair, Cambria, Huntingdon and Somerset counties more than \$28,500 has been authorized. In Allegheny, Beaver and Westmoreland counties about \$9,000 has been authorized. In Fayette, Greene and Washington counties approximately \$21,000 has been authorized. In Erie, Crawford, Forest, McKean and Warren counties nearly \$30,000 has been authorized.

Propose a New West Virginia State Road.

Grafton, W. Va.—The building of a splendid state road from Pittsburgh, Pa., through West Virginia, passing through Morgantown and Grafton, then down through the southern part of West Virginia to the Virginia line, cutting through Virginia, to Tennessee and on south to Bristol, Tenn., was outlined here by Road Engineer A. D. Williams, of Morgantown. The road departments of the four states mentioned are interested in the project, and Engineer Williams says that the plans are already being prepared. He was unable to estimate the cost of the work. Mr. Williams says that the governors of West Virginia and Tennessee will cover the entire proposed route by automobile this fall, starting from Pittsburgh and going all the way through to Bristol, Tenn.

Ohio Investigates Dust Problem.

Columbus, O.—So serious is the dust problem on public highways that it is calling for attention by the State Highway Department and Commissioner Marker has detailed a deputy to work out a solution. A. H. Hinkle, engineer in charge of the department of maintenance and repair, has been working on the proposition. A bulletin giving results of his experiments, together with recommendations will be issued within two weeks and will be distributed free. Dozens of inquiries come to the department every week as to how to treat various types of roads. Instead of answering each inquiry specifically, it is planned to send a copy of the bulletin.

City and County Test Glutrin.

Bristol, Tenn.—Commissioner Keller has begun the laying of a carload of glutrin recently received by the city. The fluid was spread by the new street sprinkler and was put on the newly spread rock, which was rolled after the treatment. Another treatment will probably be put on after the road is thoroughly settled. The glutrin will be used on Eighth street as an experiment.

Hartford City, Ind.—The use of glutrin, which is called for in the specifications for three roads, is a new thing in Blackford county road construction. County Surveyor Frank Wallace and the county commissioners went to Tipton to look at several roads there which have been built with glutrin mixed with the crushed stone. Complete satisfaction has been met in the use of the material there, it is said.

Butte to Try Wood Blocks.

Butte, Mont.—Creosoted wood block will receive its first trial in Butte. The paving committee has recommended its trial on one street to the council. Butte is probably one of the few cities in the United States of its size with no creosote block paving, and the new material will be watched with interest.

Indiana's New Highway Commission Begins Work.

Indianapolis, Ind.—The State Highway Commission, recently appointed by Governor Ralston to investigate road conditions and road laws of the state, has held its first meeting with the Advisory Commission. President Harris made an address to the commission explaining present road laws and conditions and outlining the work that the commission is expected to do. He said that all public roads belong to the state, and are under its legislative power and control. Yet no state tax is levied on the people and property at large to provide good roads throughout the state. The only existing provision of this kind is the automobile tax which is estimated in the office of the Secretary of State will raise for the year 1914 about four hundred thousand dollars. Aside from this fund the state itself contributes nothing for the construction and up-keep of the roads of the state. The following summary of road conditions was prepared by the State Statistician:

| | |
|--|----------------|
| Number miles gravel roads Jan. 1, 1914..... | 26,364 |
| Number miles unimproved, Jan. 1, 1914..... | 36,461 |
| Number miles gravel road constructed, 1913 | 1,740 |
| Gravel road repairs, 1913 | \$2,017,205.37 |
| Bridges and bridge repairs, 1913 | 2,001,129.32 |
| Road tax worked out June settlement, 1913..... | \$55,469.10 |
| Township gravel road bonds outstanding: | |
| January 1, 1910 | 17,098,476.37 |
| January 1, 1911 | 20,501,175.44 |
| January 1, 1912 | 23,441,332.37 |
| January 1, 1913 | 27,489,262.26 |
| January 1, 1914 | 30,950,587.94 |

There are one thousand and seventeen townships in the state, and under the present system the officers and people in each township improve or do not improve the public roads as they may determine for themselves. Each town-

ship has power to improve the public roads therein with such material and in such way as it may determine. The present law, therefore, provides only for a sort of miscellaneous patchwork system both in the kind and in the extent of the improvement. The people of a township are not able to pay all cash down for any important improvement made on a road, and provision is made to the effect that non-taxable road bonds may be issued in annual series running for ten or twenty years, bearing interest at four and a half per cent. While these bonds are issued by the county commissioners they are, in law, only a charge upon the property of the township. These bonds are increasing rapidly from year to year. The interest charged on these bonds alone is nearly \$1,500,000.00 annually, to which must be added the yearly maturing bonds. The permanent roads within the state are under no uniform system, but each township on its own initiative makes such improvements of such roads as the people and officers thereof from time to time determine. Probably one-third of the entire population of the state live in the cities and towns who, generally speaking, contribute little or nothing to the construction of the general highways of the state. The Act of March 15th, 1913, authorizes a township road tax of not more than thirty cents on the hundred dollars to be levied on all property in a township outside of the corporate cities and towns. To this may be added a levy of ten cents more on the hundred dollars for the construction and repair of bridges and culverts and for other road purposes.

President Harris estimated in round numbers that five thousand persons in all have to do officially in various ways with the administration of the system of building and maintaining the public highways throughout the state. He said there is no requirement of knowledge or competency for the discharge of these duties. There is no unity in method or organization, or state regulation or supervision, direction or control. Little or nothing is being done for the safety of the traveling public at railroad crossings, where accidents of maiming and death are occurring daily.

It was decided to hold, during September, a public hearing in each congressional district. The county commissioners, highway superintendents and township trustees will be asked to make reports to the commission and to these meetings, of the conditions in their respective counties. The public will be invited and all interested persons will have a chance to be heard. Demarcus C. Brown, State Librarian, has offered the services of his department to the commission in collecting information relative to the work, and Mr. Brown has been asked to obtain literature concerning roads from the federal government and various states, and this material will soon be in the hands of the commission.

SEWERAGE AND SANITATION

Infected Rats Found.

New Orleans, La.—Three rats infected with bubonic plague germs have been found in New Orleans, according to announcement of Dr. W. C. Rucker, assistant United States Surgeon General. The three rodents were taken from widely scattered sections of the city, but not near the place where the first of five plague cases developed some weeks ago. Each of the residences where the plague rats were captured has been fumigated and otherwise cleaned up. It was decided to intensify the cleaning and rat eradication work in three districts, each of which has the waterfront for one of its boundaries. One of these districts will be under the supervision of R. A. Karney, sanitary inspector of Government buildings at Washington, who is en route here. Another district will be in charge of Assistant Surgeon General C. V. Akin and Assistant Surgeon General C. A. Carmelia will have charge of the third district. Chickens probably will be barred with rats by authorities. The health officers will ask the city council to pass an ordinance making it unlawful to keep chickens within prescribed districts in the city. The chickens do not harbor plague germs, the doctors say, but feed thrown to them attracts rats. More of the 31,000

rat traps ordered have arrived and are being placed. The plague has now claimed its fourth death victim here. Dr. W. C. Rucker, Assistant Surgeon General in charge of the plague fight, said that he had word that Past Assistant Surgeon Hugh De Valin would leave Washington for New Orleans to join other federal physicians in the work immediately.

Norfolk, Va.—For dissection and examination for the presence of bubonic plague germs several rats, selected from various parts of the city where crusade against rodents is being vigorously prosecuted, have been shipped to Dr. John Anderson, hygienic laboratory, Washington, by Health Commissioner Powhatan S. Schenck. Shipping cases specially constructed and so arranged that dead rodents can be packed in dry compartment and surrounded with ice have been constructed for the transportation of the rats.

Typhoid Epidemic in Winfield, Kans.

Winfield, Kans.—Winfield has a serious epidemic of typhoid fever. The council has just held a special session to combat it. Fourteen persons are down. It seems probable that the infection got into the wells during the recent rains. Doctor Kelly, county physician, recommends the boiling of the water. The city will employ a nurse to go from house to house in the afflicted district to give instructions concerning sanitation.

Emergency Plant in Typhoid Epidemic.

Henderson, Ky.—Duke Hays, assistant state engineer, has arrived under orders of the State Board of Health to install an emergency filtration plant at the city waterworks to combat the typhoid fever epidemic now prevalent in the city. The plant is ready for operation and will be used until the disease is abated. Hypochlorite of lime is forced into the intake pipe and pumped with the water into the reservoir. The city plant pumps daily 3,000,000 gallons of water.

Investigate New Jersey River Pollution.

Newark, N. J.—The State Board of Health and representatives of the municipalities interested in the joint outlet sewer, which includes the Vailsburgh section of this city, are making an inspection as a result of a complaint that the sewer is polluting the waters of the Elizabeth River. The inspection is directly the outcome of a request by Chief Engineer Morris R. Sherrerd and the Board of Works that an investigation should be made to determine the possibility of effecting a remedy. It is alleged that during storms the sewage carried through this flume gets into the Elizabeth River. The municipalities involved, besides Newark, are Irvington, Millburn, South Orange, Short Hills and Summit. The State board recently took steps to enjoin the municipalities from continuing the operation of the outlet.

Mayor Fined in Sewer Case.

Indianapolis, Ind.—Don M. Roberts, Mayor of Terre Haute, was fined \$100 and costs in the Federal District Court. Roberts was accused of contempt of court because he interfered with the work of cleaning a Terre Haute sewer ordered by United States Judge A. B. Anderson. After hearing the testimony and the arguments in the case, Judge Baker found Mayor Roberts guilty of technical contempt, and imposed the fine. He accepted Mayor Roberts' apology.

Fight Increased Sewer Rates.

Collingswood, N. J.—Collingswood residents will present strong opposition to the proposed raise in sewer rates when a hearing is held before the Public Utilities Commission in Camden. A committee was appointed to confer with a committee of West Collingswood and with borough council and mayor to employ the proper engineer and legal counsel whose duty will be to estimate the value of the Collingswood Sewer Company and disposal plant. The citizens present subscribed nearly \$300 to finance the work, which will be used with \$200 from West Collingswood. Figures show that the proposed raise in sewer rates would amount to from 60 per cent in many cases to 300 and 400 per cent in several cases and even 500 per cent in one case.

WATER SUPPLY

Metering Successful in Newark, N. J.

Newark, N. J.—The Board of Works has received a report on the water department from David Holmes, the chief accountant. The report which embodies a new method of accounting is an amplification of the balance sheet and income account which had previously been certified to by Price, Waterhouse & Co., public accountants, and which was published some months ago. It is in conformity with an order of the State Board of Public Utility Commissioners, and instead of being entirely on a cash basis includes the revenue basis. As interesting as any part of the details are those which show that more than 70 per cent of the total revenue is yielded by the metered service of 6,897,000,000 gallons as against approximately 7,620,000,000 gallons unmetered. The net revenue for metered service averaged \$131.53 per million gallons, as compared with an average of \$42.96 on the unmetered consumption. The general average on all classes of revenue was \$85.88 per million gallons. The figures show a normal increase in the gross revenue, or \$65,928.88, but an unusual decrease of \$73,107.25 in the expenses of the department. The decrease is shown in a better adjustment of claims, a more equitable method of deductions and closer scrutiny of operating expenses. The inauguration of the revenue basis means that all income for the year has been credited, whether it has been collected or not, while all expenses have been charged, whether paid or not. In this way the cash accounts at the end of last year were shown to be \$296,412.77, as against \$174,000 the preceding year. The net earnings of the department, which were \$99,182, it was shown in the new form of report, really meant an increase of about \$116,000 because of a deficit which occurred the previous year.

Broken Mains and Water Famine.

Manchester, N. H.—A mysterious break in either the mains or the reservoir of the water system of the town of Pembroke has left the village of Suncook, 14 miles from this city, absolutely dry. In case of fire, the department would be helpless. The reservoir is wholly emptied and townspeople are depending on a few wells for water, most of which have been nearly exhausted. The water system is owned by the town of Pembroke and Suncook associated. Until July 1, 1914, this system was owned by a private corporation, the Suncook Water Works. The change was sanctioned after a long, bitter fight and several hearings by statute passed by the last Legislature. There are rumors of malicious tampering with the waterworks, and the water commissioners are investigating.

To Investigate Brooklyn Water Supply.

Brooklyn, N. Y.—Upon Mayor Mitchell's recommendation, the Board of Estimate decided to authorize Commissioner Williams to employ Delos F. Wilcox, as an expert, to investigate the plants and systems of the private water companies in Brooklyn, Queens and Staten Island, so that the city may be fully informed, when negotiations are opened for the purchase of these systems. Mr. Wilcox's employment by the city will not extend beyond October 15. The compensation of \$50 a day, which it is proposed to pay Mr. Wilcox for his services, is the rate of compensation which has been paid in other cities.

New Reservoir Planned.

Eugene, Ore.—The Eugene water board has decided upon a reservoir of the sloping type to be built on College Hill, on property bought several months ago. Two different designs are now being worked up by Supt. C. A. Whipple, one with a depth of about ten feet and the other with a depth of fifteen feet. The reservoir will contain approximately 2,500,000 gallons of water when completed and the deeper, of course, would cover less surface territory than the shallow one. The plans will be thoroughly worked up before the board decides whether to let the work out by contract or to do it by day labor under the direction of a superintendent. The first shipment of pipe for the several miles of new main extensions will be here in less than three weeks. The Kennedy Construction

Company will be ready to begin work by that time and will probably have all of its equipment on the ground by the date of the arrival of the first car load of pipe. It is probable that the Kennedy company will send to Eugene one of their trench-digging machines which they used in building the big trunk sewer here last year.

North Tonawanda Forced to Buy Water.

North Tonawanda, N. Y.—It has been found necessary to increase the pumping capacity of the North Tonawanda water system, and E. O. Spillman, chairman of the board of public works, has been requested by the other commissioners to arrange with Lockport for a part of the water, which it is able to pump with its engines in the station built at North Tonawanda a few years ago. The North Tonawanda station is now equipped with one 6,000,000 and two 2,000,000 gallon engines, giving the plant a total pumping capacity of 10,000,000 gallons. During the summer, when the use of water is more extensive than in the winter, over 8,000,000 gallons a day have been pumped and each year is marked by an increase in pumpage. The public works commissioners consider that it will be only a matter of a comparatively short time when the supply must be increased, through the addition of larger pumps at the station on Tonawanda island or the service of the Lockport station. The Lockport pumping station has the use of three 5,000,000 gallon pumps. When operating the three pumps it is possible now to get a trifle less than the rated capacity, due to the friction from the outlet, which is not large enough to take the water as fast as it can be pumped. In operating only one of the pumps a capacity of 7,000,000 gallons has been registered. Only one pump is now necessary to supply Lockport with an average daily pumpage of 6,000,000 gallons.

La Porte's Supply Inadequate.

La Porte, Ind.—Although the machinery that has been installed at the Kankakee pumping station is adequate to handle enough water for the city, there is not, however, a large enough supply coming from the well—especially during the summer months. City Superintendent Harding and other city officials are therefore working on the problem of increasing the supply. The well is 40 feet in diameter and 25 feet deep. From the walls thirteen screened points are sent out and this number will probably be increased. From the well the water goes to the new concrete pumphouse where the new motor-driven, 2,000,000-gallon Hill-Tripp centrifugal pump forces the water through an 18-inch main to the central distributing station four miles away in the center of the city. Besides the Hill-Tripp pump there are two others in reserve, one a 1,500,000-gallon pump made by the Union Pump Co., Battle Creek, Mich. The Hill-Tripp pump, made by the Hill-Tripp Pump Co., Anderson, Ind., is showing 13½ per cent higher capacity than the rated. The greatest amount that can be furnished is 2,250,000 gallons, while the greatest consumption is 2,800,000 gallons. The rest has to be taken from the Lily Lake. This Superintendent Harding and Mayor D. H. McGill are unwilling to continue. They propose to take water from the little Kankakee creek, near the well, if it is found to be pure. It is proposed to dam up the water into a small lake at a cost of a few thousand dollars.

STREET LIGHTING AND POWER

Electricity Company Has No Monopoly Rights.

Philadelphia, Pa.—City Solicitor Ryan has sent an opinion to Director Cooke, of the Department of Public Works, in which he says that he knows of no statute or ordinance that might be construed to give the Philadelphia Electric Company exclusive right to supply the city and its residents with electricity. In effect, the city solicitor asserts that Philadelphia is an open field for any electric companies which may obtain a State charter, a construction franchise from councils and a certificate of convenience and necessity from the Public Service Commission. Director Cooke has already declared that the industrial pre-eminence of Philadelphia is threatened by the "slothful and inefficient" management of the Philadelphia Elec-

tric Company, and has rejected that company's bid for city street lighting in 1915, denouncing it as exorbitant. City Solicitor Ryan further advised Director Cooke that no ordinance exists which can hamper the Public Service Commission in regulating the rates and charges of the Philadelphia Electric Company, although such regulation cannot be made by the city itself. The Philadelphia Electric Company has within the last few days filed its schedule of rates with the public service commission in a volume declared to be exhaustive and complicated. The filing of that schedule followed an acrimonious discussion between Director Cooke and the company's officials. In substantiating his contention that Philadelphia is an open field for electric companies, City Solicitor Ryan says: "The subject of the rights of electric light, heat and power companies is reviewed in an opinion of the secretary of the commonwealth, and it is very clearly shown by that official that such companies are not possessed of exclusive privileges; that whatever rights they have do not prevent the conferring of similar powers upon other like companies with respect to the same localities. The act of assembly under which electric companies are incorporated omits any provision giving such companies exclusive privileges which by other statutes are conferred in terms upon certain companies exercising the right of eminent domain."

Light Company Rate Surpasses Franchise Limit.

Middleburg, Pa.—In a struggle between the town council and the Middleburg Light, Heat and Power Company, to a certain extent involving the Public Service Commission, the borough authorities threaten to annul the franchise granted in May, 1909. The franchise given to the company expressly states that it is granted on the condition that the rate for electric current shall not exceed 10 cents a kilowatt hour, and in face of this the company has obtained approval from the Public Utilities Commission to put in force a rate of 12½ cents, and a minimum rate of \$1 instead of 75 cents. The clerk of the council has already asked the company, whose headquarters are at Lewistown, to restore the old rates. The Northumberland County Gas and Electric Company has a large water electric plant at Selinsgrove, just ten miles away, and if the franchise be repealed this company will be asked to build transmission lines to Middleburg by way of Freeburg, Kreamer and Swineford. The borough councilmen have gone on record against the Public Utilities Commission.

Mississippi Breaks Cofferdam.

St. Paul, Minn.—A cofferdam built for the purpose of completing a concrete lock and dam for navigation and power purposes, situated midway between St. Paul and

Minneapolis, on the Mississippi River, has been washed out. The dam is being constructed under the direction of Charles L. Potter, of St. Paul. It is intended to furnish power for the use of the University of Minnesota and of St. Paul and Minneapolis for street lighting purposes. The illustrations show a view of the dam and of the broken cofferdam.

Changing Lighting System.

Pittsburgh, Pa.—Instead of the central arc lights at long distances, side lights about every hundred feet have been placed on downtown Fifth Avenue. The installation of these lights cost the city nothing, as the Duquesne Light Company placed them at its own expense on the trolley poles of the Pittsburgh Railways Company's trolley poles. The cost of lighting will be somewhat increased on account of the greater number of lights.

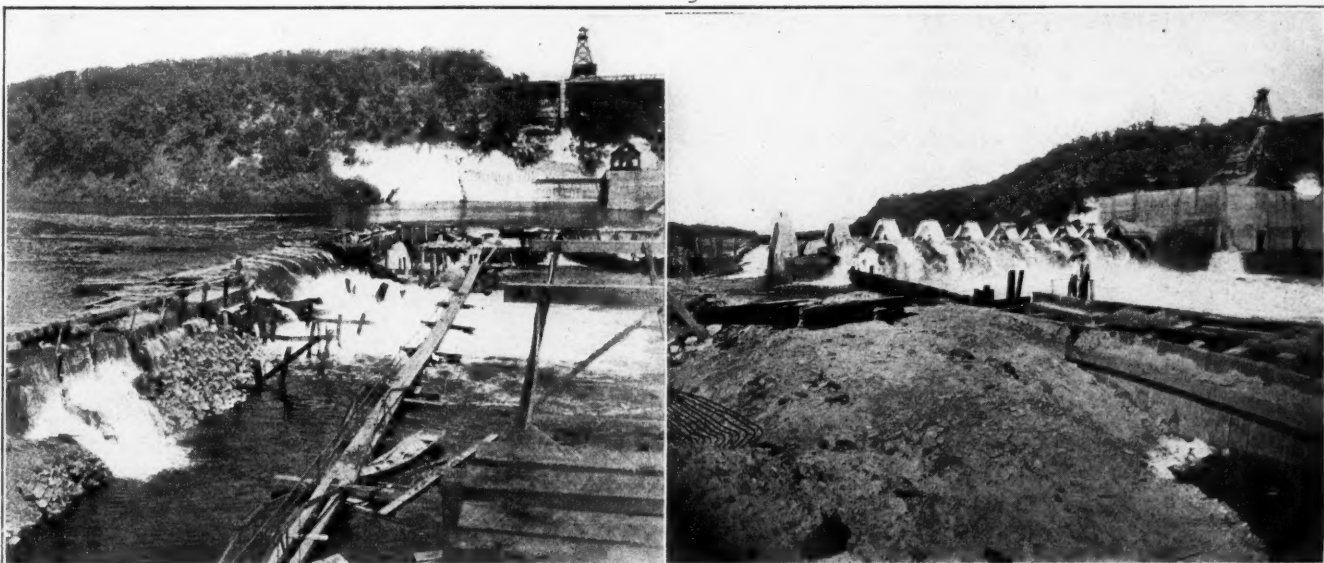
FIRE AND POLICE

The Rebuilding Commission of Salem.

Salem, Mass.—The rebuilding commission of the city of Salem at a meeting issued the rules it has adopted for the rebuilding of the burned district and also gave out a list of streets, which would have their lines changed. The regulations are voluminous and go into detail of just what sort of construction must be employed. The commission intends to make the burned district absolutely fireproof, refusing the construction of anything but fireproof structures in the territory. The construction within this district must be either of what is technically known as first-class or of second-class. In some instances wooden floors and partitions will be permitted, but other parts of structures must be of incombustible materials. Rules are also laid down regulating the installation of heating apparatus to safeguard against fire. No billboards will be permitted within the district. Business men on the industrial streets, who have large financial interests at stake are uneasy over the delay in deciding just what streets are to be widened. It was expected by many of the citizens that decisive action would be taken regarding rebuilding of residences on more than 50 streets affected by the fire. Only tentative plans, however, were adopted. Subscriptions to the relief of Salem totaled \$535,242.34, according to an announcement at the meeting. \$1,800 from the citizens of Quincy, Norwood \$500, Whitman \$587 were announced.

City Must Pay Two Police Forces.

Nashua, N. H.—The supreme court has handed down an opinion directing the city of Nashua to pay the salaries of both sets of police officers who have been claiming to be the rightful guardians of law and order in that municipality. A new police commission, appointed under an act of the legislature of 1913, created a new police force in a manner which was claimed to be illegal, and this



Courtesy, Saint Paul Pioneer Press, St. Paul, Minn.

BROKEN COFFERDAM AND THE POWER DAM ON MISSISSIPPI.

contention was upheld by the court. At the same time it is ruled that the officers appointed by the commission and who have been actually discharging the duties of the force are entitled to compensation from the city.

New Orleans Fire Station Completed.

New Orleans, La.—Mayor Behrman has accepted the new Central Fire Station officially turning over the keys to Deputy Commissioner Alex Pujol of the Department of Public Buildings. The basement of the building will be used to house the apparatus to be installed, all of which is motor driven. Also in the basement are rooms for a workshop and a small kitchen. In the second story are rooms that are to be occupied by Chief Pujol, one assistant engineer and the offices of the Board of Fire Commissioners. A large room in the center will be a dormitory for the firemen, of whom there will be thirty-two on duty. There are eight sliding poles for the firemen to reach the basement rapidly. Sanitary drinking fountains are located in various parts of the building. In the rear of the building is a five-story drill tower, the first built in New Orleans. It is sixty-five feet high and has fire escapes and windows, which will be used with scaling ladders and life belts in the drills. The building is handsomely finished with glazed bricks and tiles in wainscoting and bathrooms. There is a locker room, with mahogany stained lockers. Chief Pujol said the equipment will comprise one 85-foot aerial ladder, one 65-foot water tower, one 60-gallon double tank chemical engine and one gasoline pump that will throw 1,500 gallons per minute, or 150 gallons more than any of the steam pumps now in use. All will be propelled by motors. Among those present at the opening were: Assistant City Engineer Willis, City Architect Christy, who designed the building; Commissioner Ricks and City Electrician Olroyd.

GOVERNMENT AND FINANCE

Council Passes Macon's New Charter.

Macon, Ga.—The city's new charter, containing 129 sections, has been passed by council. Eight new charter amendments are included. All of the amendments with the exception of the pension bill were passed as a whole. The proposed new charter was unanimously adopted and will be forwarded immediately by City Attorney Walter Defore to the Bibb County legislators in Atlanta for official passage. Most important from the standpoint of the taxpayers is the amendment which provides for pensions for policemen, firemen and other employes grown old or disabled during their years of service to the city. Another amendment is the bill which would place the locker clubs under the control of the city instead of the state, and providing a license for each club of not less than \$5,000. The amendment to place the policemen and firemen of the city under civil service rule is also an important one. Other charter amendments passed on favorably by council which will be acted on with the others mentioned, as a whole are:

Amendment to definitely establish the boundary lines of the city.

Amendment to appropriate \$5,000 a year toward navigating the Ocmulgee river.

Amendment to establish a city tree and park commission.

Appeal on the Hall bill, which deals with assessments on sewers and paving improvements.

Amendment to change the makeup of the assessor board, and also to change the method of paying taxes.

Topeka Living Within Income.

Topeka, Kan.—The city has \$70,997.94 on hand for running expenses, not including bonds and coupons, until the end of the year. R. L. Bone, commissioner of finance, states in his semi-annual report just issued. The first six months, which ended June 30, left Topeka in excellent shape. Less than half the allotted amounts has been spent in practically every fund.

"This means," declared Commissioner Bone, "that Topeka will make an excellent financial showing January 1,

1915. We have more than half the budget allowance left. We're living within our income. The commission form of government is an economical proposition. Figures show it. The council was always behind."

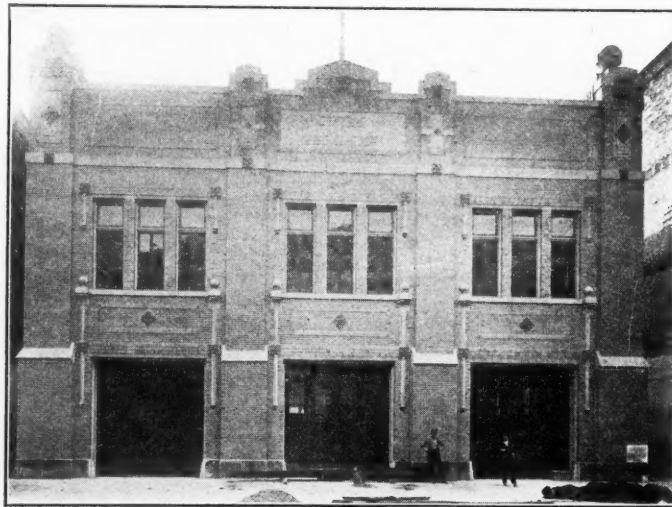
A list of some of the various funds with, first, the annual budget allowance, and, second, the amount on hand at the end of the first six months, follows:

Fire department, \$73,385.82; \$41,541.08. Police department, \$39,263; \$19,738.82. Erection of North Topeka fire station, \$17,500; \$2,425.53. Engineering department, \$9,000; \$5,670. Street department, \$41,000; \$24,667.74. Asphalt department, \$45,000; \$23,003.22. Street repairs and incidentals, \$2,600; \$1,856.70. Electric light, \$16,966; \$7,632.72. Public buildings, \$3,825; \$1,301.30. Sanitation and health department, \$7,895; \$3,168.27. Milk inspection department, \$1,300; \$583.39. Foods, weights and measures, \$1,000; \$532.43. Plumbing inspection, \$1,460; \$738.65. Crematory, \$11,000; \$7,155.64. Salaries of Mayor, commission, stenographer, \$10,300; \$5,150. City Clerk's office, \$3,000; \$1,589.67. City Treasurer's office, \$1,350; \$723.76. City Attorney's office, \$3,600; \$1,843.15. Auditor's office, \$1,496; \$808.90. Electrical Inspector's office, \$1,095; \$577.24. City printing, \$1,000; \$884.16. Civil Service Commission, \$100; \$70. Public parks, \$21,069.41; \$12,403.46. Special lighting, \$8,404; \$6,141.02.

MISCELLANEOUS

To Dam the Hudson in Big Pier Building.

New York, N. Y.—Dock Commissioner R. A. C. Smith has reported to Mayor Mitchel that the work on the new piers for the accommodation of the largest passenger steamships is proceeding rapidly. The work necessitates the building of an immense coffer dam to keep back the water of the river while excavation is going on. The structures will be 1,050 feet in length and 150 feet wide, with slips between them 360 feet wide. The slips will be dredged and excavated to a depth of forty-four feet below mean low water, allowing ample accommodation for the largest and deepest steamships now entering the port or that are likely to arrive here for many years. The pier and a half will furnish three berths, and these, it is estimated, will be sufficient for some time. When the terminal is completed, Commissioner Smith says, it will provide the finest and most accessible wharfage accommodations to be found in any harbor in the world, and



Courtesy, New Orleans Times-Picayune, New Orleans, La.
NEW ORLEANS NEW FIRE STATION.

it will mean that passengers will be landed from the largest liners at a point of unrivalled accessibility to the center of the city, with the largest hotels and railroad depots only a few minutes from the terminal. Progress in carrying out the agreement with the Federal Government as to the situation in the Hudson River proceeds satisfactorily. The city has reached a period in the work where engineering skill has been put to a supreme test. After the dredging had been completed, work was immediately begun to provide for the blasting out of the bed rock at the inland end of the territory where the 1,000-foot berths are to be. To do this blasting necessitated the disposal of the water lying over the rock to be removed. To accomplish this a coffer dam was devised,

practically to dam the waters of the Hudson. The most modern and ingenious devices that engineering skill has devised are being employed in the construction of this dam. When the water lying between the dam, when completed, and the upland has been pumped out, this dam will be holding the prodigious weight of the volume of water of the main body of the Hudson. This dam is unusual in the size and the demands on it. No duplicate of the dimensions of this situation has ever been created by engineering processes. As a preliminary to the construction of the temporary dam a contract was let for the dredging away of all soft material covering the bed-rock. A contract was also let for the construction of the temporary dam and the rock excavation. The Dock Department engineers estimated that the work would cost \$497,500. Eleven contractors bid upon the work, their estimates ranging from \$487,812.90 to \$708,128.52. The contract was awarded to Holbrook, Cabot & Rollins, the low bidder.

Great Revenue in Signboard Fines.

Brooklyn, N. Y.—The owners of 5,000 signboards in Brooklyn are facing penalties of \$300 to \$400 each for violation of an ordinance passed by the Board of Aldermen in May, to take effect immediately, requiring that every ground sign and roof sign structure existing or hereafter erected shall be registered with the Bureau of Buildings, and shall have displayed the name and address of the firm maintaining the sign. The penalty for such failure to register is \$10 a day for each neglect, and the sign may be removed by the Bureau of Buildings. A canvass of the borough made by the Bureau of Buildings shows that there are over 5,000 signs in this borough the owners of which have failed to take any notice of the ordinance. It is not compulsory on the part of the authorities to notify the owners of signs of the passage of the ordinance, but the bureau has voluntarily done so, and it is alleged that there is no excuse for the delinquents. Summons and complaint papers are being prepared in the office of the Corporation Counsel, and it is expected that actions will be begun against all delinquents in a few days. It is said that if all the fines are collected the total will amount to \$1,750,000 up to the present date. An effort is being made by the city to prevent the many accidents that have happened in the past from unsafe structures that have been torn down by the wind or have been destroyed from other causes, especially in the case of roof structures.

The price of a permit for a new sign is \$2 for ground structures; for roof surface, \$5, and for roof structures having a wire or other openwork surface, \$10. Every structure must be inspected at least once in each year. The failure to obtain a permit before erecting a sign renders the owner liable to a penalty of \$100 for each offense and liability to a penalty of \$10 a day for each day it is so maintained. Nor can any sign be rebuilt or altered without inspection and permit.

No ground sign within the fire limits shall be over twelve feet high, and the owner of the sign shall be compelled to keep the vacant space occupied by such sign clean and free and clear of all noxious substances. Roof sign structures shall be constructed so as to leave a clear space of at least seven feet between the roof and the lowest part of the sign, at least seven feet between each of the vertical supports and shall not interfere with any openings or fire escapes on the building. No solid face roof sign shall be over thirty-one feet above the roof level at any point, and no openwork sign more than seventy-five feet above the roof at any point, upon fireproof buildings, and fifty feet upon non-fireproof buildings. The portions of such structures exposed to wind pressure shall not exceed 35 per cent. of the total area.

City Successful in Oil Business.

Pasadena, Cal.—Pasadena's municipal oil pit has just been inspected by the city commission. This pit cost \$2,200 in cash, but the taxpayers will not have to pay that amount. The commissioners save them that by seeing that the city makes a small profit on the oil it sells. The municipal oil pit is situated near the municipal lighting works. Commissioner T. D. Allin, of the department of public works, said that the total storage capacity of the pit is six cars. He thinks that Pasadena is practically the only city to handle its own oil. This city buys the oil, gets it tested, and sells it. Sometimes several carloads a month are sold to contractors. It is not aimed to make any profit outside of installation, operation and improvements. The cost of the entire pit will be paid out of the profits on the oil instead of having to be paid by the people out of the taxes.

LEGAL NEWS

A Summary and Notes of Recent Decisions— Rulings of Interest to Municipalities

Defective Streets—Injuries—Contributory Negligence.

Chase v. City of Seattle.—Plaintiff was thrown from his wagon and injured as the result of a defect in a city street on returning from delivering a load of wood. On his going trip he discovered the defect at a turn, and that the turn could not be made with the team and wagon so as to keep the wheels in the traveled way outside of the defect, unless the team was swung somewhat out of the beaten path. He did not do this on his return, but turned abruptly into the cross street, causing the hind wheel of the wagon to pass over the depression, which, together with the cramped position of the wagon, caused him to be thrown out. Held, that he was negligent as a matter of law.—Supreme Court of Washington, 141 P. R. 180.

Irrigation District—Objection to Assessments—Estoppel.

Page v. Oneida Irri. Dist.—Where it is shown that a landowner within an irrigation district seeks to avoid the payment of assessments levied against his land by the district because of alleged irregularities or infirmities in the issue of bonds, and who, with full knowledge of such alleged defects or infirmities, has, by his silence, acquiesced in the expenditure of the fund derived from the sale of said bonds, and who has had knowledge that said bonds were passing into the hands of bona fide purchasers, held, that he will be estopped by his laches from being heard to object to the payment of such assessments.—Supreme Court of Idaho, 141 P. R. 238.

Officers—"Recall"—Sufficiency of Charge.

Pybus v. Smith, City Clk.—That a councilman agreed and did trade votes with another councilman on matters pending before the common council of a city was "malfeasance in office" with Laws 1913, c. 146, providing that, when any voter or voters desire to demand the recall of any officer, he or they shall prepare a typewritten charge reciting that such officer has committed "an act or acts of malfeasance while in office," stating the acts complained of, and hence formed sufficient legal cause for submitting to the voters the question of his recall.—Supreme Court of Washington, 141 P. R. 203.

Defective Streets—Notice—Complaint.

City of Indianapolis v. Stokes.—A complaint in an action against a city for injuries to a pedestrian, falling into a hole in the street after alighting from a street car, which alleges that the city negligently permitted the hole to remain in the street at a point where a street car company usually took on and let off passengers; that the hole was about eight inches deep and of irregular shape; that the city had full knowledge of the existence thereof in time to have repaired the same before the accident, but failed to do so, and failed to protect the same, or place warning lights around it; and that the hole was dangerous to the public, and especially to persons boarding or alighting from cars at that place—charges both actual and constructive knowledge of the city of the existence of the hole in time to have remedied the defect before the accident.—Supreme Court of Indiana, 105 N. E. R., 477.

Streets—Establishment—Cost Payment.

In re Boyer Avenue in City of Seattle.—Where land was condemned for a street 75 feet wide to form a section of an avenue of similar width at either end, which was an arterial highway of the city, and it was conclusively shown that every local benefit which could be conferred on the local property assessed for the improvement would be furnished by a street 66 feet wide, which is the ordinary width of local as distinguished from arterial streets, the property owners were entitled to have the cost of the excess, equal to 12 per cent of the entire cost, borne by the city at large.—Supreme Court of Washington, 141 P. R. 58.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Aug. 5-7.
COUNTY COMMISSIONERS OF PENNSYLVANIA.—Annual Convention, Erie, Pa. T. W. Waterhouse, Chairman Local Committee.

Aug. 5-7.
UNION OF CANADIAN MUNICIPALITIES.—Fourteenth Annual Convention, Sherbrooke, Que. Sec.-Treas., W. D. Lighthall, Montreal.

Aug. 10-12.
MONTANA GOOD ROADS CONGRESS.—5th Annual Convention, Great Falls, Mont. Secretary, Walter S. Clark, Great Falls.

Aug. 10-15.
MASSACHUSETTS STATE PERMANENT FIREMEN'S ASSOCIATION.—Annual Convention, Lynn, Mass.

Aug. 18, 19, 20.
FIREMEN'S ASSOCIATION OF THE STATE OF NEW YORK.—Geneva, N. Y.

Sept. 1.
PACIFIC COAST ASSOCIATION OF FIRE CHIEFS.—Annual Meeting, Vancouver, B. C. Exhibition of apparatus, August 28, San Francisco.

Sept. 9-11.
NEW ENGLAND WATER WORKS ASSOCIATION.—Annual Convention, Boston, Mass. Secretary, Willard Kent, Narragansett Pier, R. I.

Sept. 15-18.
INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS.—Annual Convention, Atlantic City, N. J. Secretary, C. W. Pyke, Electrical Bureau, Philadelphia, Pa.

Sept. 21-25.
ILLUMINATING ENGINEERING SOCIETY.—Eighth Annual Convention, Cleveland, Ohio. Assistant Secretary, Joseph Langan, 29 West 39th street, New York City.

Oct. 6-9.
AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS.—Annual Convention, Boston, Mass. Secretary, Charles Carroll Brown, Indianapolis, Ind.

Oct. 20-23.
INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS.—Annual Convention, Grunewald Hotel, New Orleans, La. Secretary, Mr. McFall, Roanoke, Va.

Oct. 21-23.
ALABAMA GOOD ROADS ASSOCIATION.—Nineteenth Annual Convention, Montgomery, Ala. Secretary, J. A. Rountree, 1021 Brown Marx Bldg., Birmingham, Ala.

Oct. 28-31.
NORTHWESTERN ROADS CONGRESS.—Milwaukee, Wis. Secretary, J. P. Keenan, Milwaukee.

Nov. 9-13.
AMERICAN HIGHWAY ASSOCIATION.—Fourth American Road Congress, Atlanta, Ga. Secretary, J. S. Pennypacker, Colorado Building, Washington, D. C.

Nov. 18-20.
WASHINGTON STATE GOOD ROADS ASSOCIATION.—Spokane, Wash. Secretary, M. D. Lechey, Alaska Building, Seattle, Wash.

Dec. 14-17.
AMERICAN ROAD BUILDERS' ASSOCIATION.—11th Annual Convention; 5th Annual Good Roads Congress, and 6th Annual Exhibition of Machinery and Materials, International Amphitheatre, Chicago, Ill. Secretary, E. L. Powers, 150 Nassau st., New York, N. Y.

Feb. 10-17, 1915.
EIGHTH CHICAGO CEMENT SHOW.—Coliseum, Chicago, Ill. Cement Products Exhibition Co., J. P. Beck, General Manager, 208 S. La Salle Street, Chicago, Ill.

North Carolina Good Roads Association.

The North Carolina Good Roads Association met at the Academy of Music in Durham for a two-day congress. The convention was formally opened by President H. B. Varner of Lexington and the reports of Secretary Joseph Hyde Pratt and Treasurer Joseph G. Brown, the discussion of a highway commission for North Carolina were taken up on the first day. Dr. Pratt voiced the sentiment of the convention in favor of a State Highway Commission in his address,

"North Carolina's Road Policy." He asserted that the majority of the work on the public roads of the State was done in a very haphazard manner, in many of the counties without proper engineering supervision. The result of this is the loss of about \$750,000 a year. Many others also spoke in favor of the commission plan. Prof. H. M. Stacy of the University discussed "A Uniform Road Law," bringing out the importance of the State passing such a law, which has already been taken up by some of the progressive localities of the States, and especially in the larger cities of North Carolina. The last half of the first day was devoted to a number of short papers, all relating to the use of convict labor on the roads. The experiences of some of the larger and more populous counties of the State were cited in favor of convict labor for constructing the roads. Some of the delegates present were carried for a tour of inspection over the roads of Durham County. They were shown the various types of roads which Durham has constructed, by far the larger part of them being macadam, sand-clay and topsoil roads.

On the second day there was an address by W. C. Hammer, who told of the methods used in his county for interesting the farmers in the work of good roads. A proposed bill for a State Highway Commission was presented by A. W. Graham of Oxford, following an address on this topic. The speaker thought the State commission should be supported by taxes from the State treasury, added to by similar funds from the counties. He suggested that the next Legislature be asked to pass a law similar to that in the State of Georgia in which all of the convicts of the State Penitentiary were used in the construction of good roads. Mr. M. V. Richards told of the work that was being done in road construction in North Carolina and other Southern States. D. H. Winslow of the United States office of Public Roads told something of the methods that should be used in keeping the roads up after they had once been built. Dr. H. Q. Alexander of the State Farmers' Union said that a little too much had been said about the highways and too little about the country roads. This was followed by a discussion of the work of the Appalachian Park Association by Geo. S. Powell, who is secretary of the association.

The association adjourned after selecting officers for the coming year, all of the old men being retained in office and amending the by-laws of the association. Probably the most important change in the constitution and by-laws was putting the association under a board of governors, instead of having the business end, election of

officers and directors of finances looked after by self-perpetuating board of governors. The next meeting place was left to the Executive Committee. Granville won the prize for best attendance with Vance County second prize; Buncombe won the prize for the best exhibit of good roads pictures.

Western Pennsylvania Firemen's Association.

Preparations are being made for the twenty-first annual convention of the Western Pennsylvania Firemen's Association on August 9th in Connellsville. One of the features will be the great parade of the firemen. The town will be decorated and many entertainments are planned for the visiting members.

The local committees of arrangements are under the direction of the officials of the New Haven Hose Company, John T. Torrence, president; J. M. Martin, vice-president, W. E. DeBolt, secretary, and W. J. Herbert, treasurer. The chairmen of the committees are as follows: Executive, F. W. Harmening; ways and means, William E. DeBolt; publicity and advertising, William J. Herbert; hotels and grounds, J. M. Haddock; transportation, J. J. Harper; amusements, Jesse A. Cypher; tournament, Thomas L. Fagan; decorating, J. M. Martin; reception, George Potter.

Pennsylvania League of Third-Class Cities.

Reports from Meadville are to the effect that that city is preparing for the entertainment of the delegates to the annual meeting of the League of Third-Class cities, to be held there August 25-26-27.

Special interest, created by the new form of government which has been adopted by the cities of this class, may prove a means of bringing large numbers to the meetings. The sessions will be given over to consideration of legislation effecting third-class cities of Pennsylvania.

Engineering Positions Opened.

In order to provide an eligible list for engineering positions which will be filled in the Bureau of Surveys in connection with the grade-crossing removals in south Philadelphia and in the northeast section, and in connection with the building of bridges and sewers, the Civil Service Commission has fixed August 10 for conducting an examination for the positions of principal assistant engineers, salaries from \$1,800 to \$2,000, and first assistant engineers, from \$1,200 to \$1,400.

The Survey Bureau was partially depleted of many of its efficient men by the organization of the Department of Transit, largely because of the higher salaries provided for the new department. The men in the Survey Bureau took the examinations for the transit work and jumped to higher salaries. Chief Webster will have the preparation of plans and the eventual supervision of work to the value of \$20,000,000, and an effort will be made to provide an adequate force.

NEW APPLIANCES

HANDLING COAL AND ASHES IN POWER PLANTS.

Concrete Suspended Bins, Larries, Locomotive Cranes and Buckets.

The large storage space needed and the corrosive action of coal and ashes on steel present a difficult problem in coal and ash handling in power plants. The almost universal use of automatic stokers on boiler installations necessitates an overhead storing bin from which the coal flows straight into the stokers. Steel bins require a high cost of maintenance because of the corrosive action of coal and ashes. The Brownhoist Patent Suspended Bin it is claimed, overcomes these difficulties. This bin, for storing coal, coke, ashes, cement, sand and other materials, is of concrete with what is known as a Ferroinclave reinforcement. The Brownhoist Bin is so designed that in the event of spontaneous combustion of coal the steel would be protected by the concrete. The design is calculated to give maximum storage in minimum space and make the bin practically self-cleaning.

The Brownhoist Bin consists essentially of two horizontal steel-plate girders, supported by upright columns or hung from trusses from which the bin construction is suspended. At intervals of from 3 to 5 feet, steel straps, parabolic in shape, are hung from these girders. To the inside of these straps the Ferroinclave is bolted and then

concrete is applied, first to the inside and then the outside of the bin. The straps are strong enough to carry the weight of the structure and material stored.

Ferroinclave is a sheet steel with

The Brownhoist weighing larry is used for taking coal from the bin, weighing it and delivering it to the stokers. It may be equipped with automatic recording scales or card registering device. The larry travels on a track



COAL HANDLING APPARATUS IN CLEVELAND PLANT.

dovetail corrugations inversely tapered, so that they may be "shingled" over each other to form a continuous sheet. The dovetail corrugations form a key for the concrete, which may therefore be applied both to the outside and inside of the bin without the use of forms or centering. The reinforcement covers the girder to which it is fastened by a special clip, so that no steel is left exposed to the coal. Ferroinclave is also used for hopper bins.

The suspended bins are equipped with chutes, gates and spouts, through which the coal flows from the bin to the stokers. The chutes are of various designs, and the gates may be hand or air operated. The spouts may either be swinging, stationary, straight or angle. The swinging spout distributes the coal evenly by being swung, while the stationary spout is equipped with a spreader. The capacity of this bin ranges from one ton per lineal foot up to 15 tons per lineal foot. Together with the bins are used weighing larries, trollies, cranes, grab buckets and tubs.

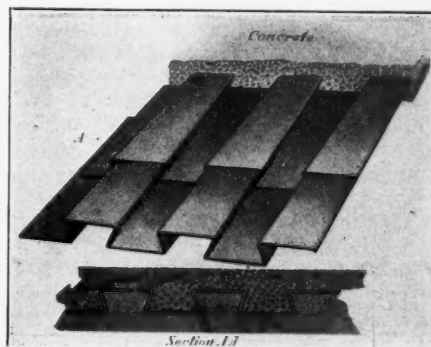
under the bin and can be operated either electrically or by hand.

The illustrations show Ferroinclave construction diagrammatically, an installation of Brownhoist Suspended Bin in the power plant of the Memphis Street Railway Co., Memphis, Tenn., and of coal larries, transfer cranes and air-operated coal gates, as installed in the Cleveland municipal electric light plant. These bins and the other apparatus described are made by the Brown Hoisting Machinery Co., Cleveland, O.

THE AVERILL STADIAGRAPH.

For Plotting Stadia Work Direct from Field Notes.

It was a distinct advance in topographical surveying to be able to stand at an instrument and determine the distance and elevation of any point



FERRO INCLINE CONSTRUCTION.

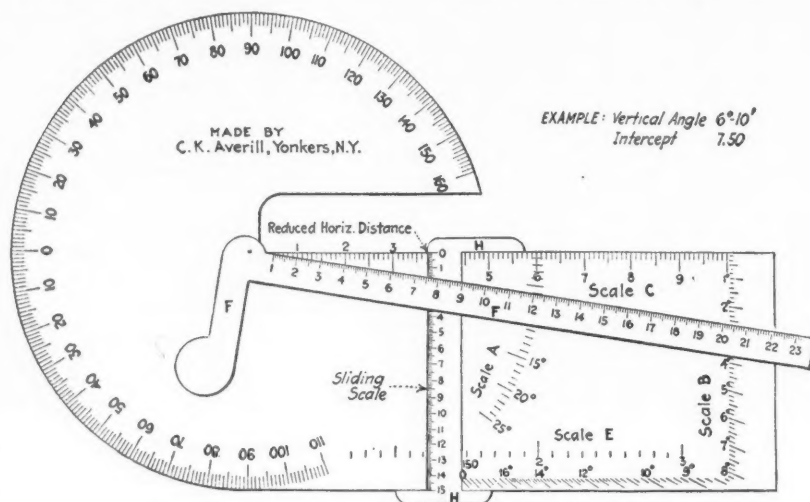
within a thousand feet by simply sighting at a rod held there. This stadia method has been in use now for some years and yet we occasionally see land surveyed for contours and topograph-



SUSPENDED CONCRETE BIN IN MEMPHIS PLANT.

ical detail by the old laborious method of chaining and leveling. Probably the calculations required to reduce the observed vertical angle and rod intercept for each shot to horizontal distance and elevation has deterred many from adopting stadia work. A good observer will record a few hundred "shots" each day, and it is a somewhat tedious process to reduce by use of slide rule, while calculating by tables is still more laborious.

There has recently been placed on the market an instrument invented by Mr. C. K. Averill, of Bridgeport, Conn.,



THE AVERILL STADIAGRAPH, SHOWING EXAMPLE.

and manufactured by the Averill Stadiagraph Co., of 141 Broadway, New York City, with which one can plot directly from the field notes onto the map without the use of slide rule, tables, diagrams, percentage multiplications, or addition, subtraction, division, or any kind of calculations whatsoever. The use of the instrument, it is claimed, can be learned in a few minutes by anybody without any special education. The scale of the map on the stadiagraph is so arranged that by turning it on its pivot to certain marks representing vertical angles and then moving the sliding scale to the rod reading the correct horizontal distance is projected upon the map without taking time or trouble to ascertain its value, but it can always be read if desired by moving up the scale of the map and reading it off. With another movement of the pivoted scale and sliding scale the difference of elevation is read off. The work of reducing and the map may be made in the field, or the reduction can be entered in the notebook and map made rapidly at the office without any calculating.

This instrument has large value outside of its use in stadia work. It is a protractor, straight edge and scale in combination—a handy instrument in any engineer's office. It also has its use as a calculating instrument apart from plotting purposes, as without using the protractor it can be used in plane table work to obtain all calculations necessary in that work. The Stadiagraph has received the endorsements of colleges, technical schools, and consulting engineers.

A RUST INHIBITIVE.

"Antoxide" is a special coating or paint for preventing the rusting of structural iron. In addition to its waterproofing qualities, "Antoxide" contains inhibitors to prevent progressive rusting should the coating be broken. The varnish-like seal vehicle is combined with proper pigments to form an elastic, impervious coating of high abrasion-resisting powers. It is claimed that these waterproofing and inhibitive qualities prevent entirely the work of moisture and atmospheric oxidation once the process has begun

tions: 4-inch, \$26; 6-12-inch, \$24; 16-inch and up, \$23.50. New York.—There was a letting at Duxbury, Mass., for 1,350 tons of 6, 8 10 and 12-inch pipe. Quotations: 6-inch, \$20.50 to \$21 per net ton. Birmingham, Ala.—Quotations: 4-inch, \$20.50; 6-inch and up, \$18.50.

Lead.—New York, \$3.90. St. Louis, \$3.75.

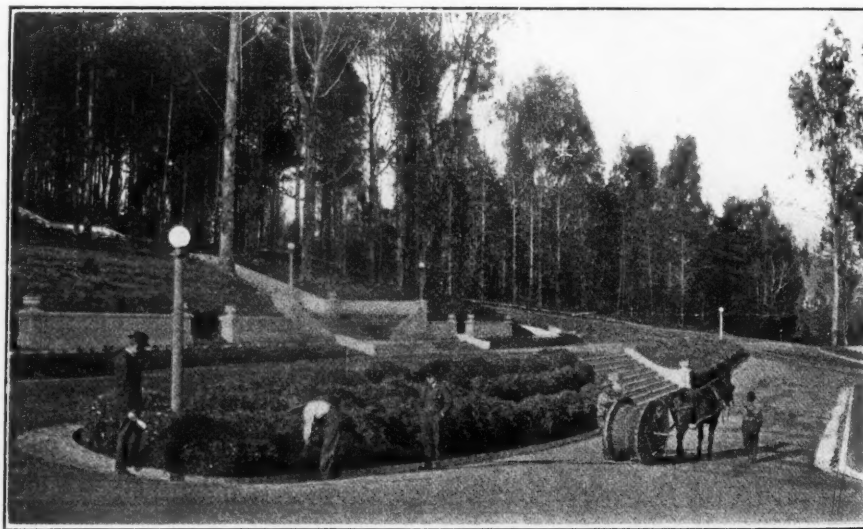
Safety Insulated Wire and Cable Co., 114 Liberty Street, New York, has just issued a very attractive book on the use of steel taped cable for all underground transmission without the use of conduits. Safety Steel Taped Cable is made to be laid directly in the earth without protection—its double coating of steel within a lead sheath being calculated sufficient protection. This does away with the expense of ducts and conduits and this cable has been used by many cities of the country for wiring under parks, for fire and police telegraph systems, boulevard lighting, emergency use lighting and power distribution. The book explains and illustrates the wire-fold construction of the cable, gives useful wiring diagrams and gives numerous fine photographs of installations. A few of the cities where this cable is being used for lighting are Battle Creek, Mich.; San Francisco, Cal.; Greenfield, Ind.; Billings, Mont.; Springfield, Ill., and Memphis, Tenn. It is considered particularly well adapted for small cities. It is being used in Washington, D. C., and almost 100 miles is under Central Park, New York.

Figures are given of comparative costs of installation. A length of 1,000 feet of No. 6 cable laid in brick street is taken as the basis. This table states that with tile duct the installation would cost \$785.00; with fiber duct—\$640.00; with galvanized steel conduit—\$606.00; with "safety" cable—\$379.00.

The accompanying illustration reproduces one of the many useful and interesting photographs in the book—laying seven miles of "Safety Cable" in San Francisco.

INDUSTRIAL NEWS

Cast Iron Pipe.—Chicago.—Outlook somewhat encouraging. Lettings will probably be closed this week for 6,500 tons at Cincinnati, 225 tons at Bingham Canon, Utah; 200 tons at Frankfort, O.; 150 tons at Decatur, Ill., and 100 tons at Hibbing, Minn. Quota-



LAYING "SAFETY CABLE" IN FOREST HALL PARK, SAN FRANCISCO.

ADVANCE CONTRACT NEWS

ADVANCED INFORMATION BIDS ASKED FOR

CONTRACTS AWARDED ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

| STATE | CITY | REC'D UNTIL | NATURE OF WORK | ADDRESS INQUIRIES TO |
|---------------------------|-------|-----------------|--|--|
| STREETS AND ROADS. | | | | |
| Neb., Omaha | | Noon, Aug. | 1..Granite paving block and cement curb..... | Frank Dewey, Douglas Co. Clk. |
| Wis., Delavan | | 10 a.m., Aug. | 1..Cement curb and gutter..... | City Clerk. |
| O., Ellsworth | | Aug. | 1..Limestone or slag macadam, with or without glutrin treatment..... | H. M. Bawman, Clk. Twnship. |
| O., Cleveland | | 10 a.m., Aug. | 1..County road improvement..... | E. G. Krause, Clk. Co. Comrs. |
| O., Uhrichsville | | Noon, Aug. | 1..Grading, draining, paving with fire clay, brick or block..... | H. O. Snyder, Vil. Clerk. |
| N. Y., Buffalo | | 11 a.m., Aug. | 1..Paving and curbing..... | Francis G. Ward, Comr. P. W. |
| Minn., Keewatin | | 8 p.m., Aug. | 1..Cement sidewalks and curbs..... | W. A. King, Clk. School Dist. |
| Ky., Nicholasville | | 3 p.m., Aug. | 1..Paving with asphalt, 4,500 sq. yds..... | W. T. Steel, Mayor. |
| N. D., Tower City | | Noon, Aug. | 1..10 blocks of concrete or cement sidewalks..... | S. F. Sherman, Acting Clk. |
| N. D., Minot | | 8 p.m., Aug. | 3..Grading and improving parts of several streets..... | H. D. Heigenstein, City Aud. |
| Ill., Chicago | | 11 a.m., Aug. | 3..Constructing cement sidewalk in several streets..... | Bd. Local Imps. |
| la., Marshalltown | | 9 a.m., Aug. | 3..Cement sidewalk construction..... | J. J. Wilson, City Clk. |
| Wis., Montello | | Aug. | 3..Cement sidewalks and crossing..... | A. J. Barry, Vil. Clk. |
| N. J., New Brunswick | | 8 p.m., Aug. | 3..Resurfacing one street..... | J. J. Curran, St. Comr. |
| Ariz., Clifton | | Aug. | 3..State Highway section..... | H. O. Tunis, Co. Surv. |
| Ind., Columbia City | | 11 a.m., Aug. | 3..Three roads..... | Chas. E. Kieser, Co. Aud. |
| Ind., Greensburg | | 1 p.m., Aug. | 3..Stone road..... | L. W. Sands, Co. Aud. |
| Mont., Lewiston | | Aug. | 3..Six blocks paving and concrete bridge..... | City Clerk |
| Pa., Midland | | 8 p.m., Aug. | 3..8,000 cu. yds. grading, 15,000 sq. yds. paving, 10,000 ft. concrete curbing, 140 ft. concrete headers..... | R. R. Owens, Boro. Engineer, Beaver |
| O., Springfield | | Noon, Aug. | 3..Paving with sheet asphalt, asphalt block, asphaltic conc., asphalt macadam, bitulithic, petrifalt or brick..... | City Engineer |
| Ind., Indianapolis | | Aug. | 3..Curbing and paving..... | Jos. A. Rink, Pres. Bd. P. W. |
| Ind., Vernon | | 11 a.m., Aug. | 3..Grading and paving..... | G. J. Bernhardt, Jennings Co. Aud. |
| Ind., Franklin | | 2 p.m., Aug. | 3..Grading and paving..... | H. L. Knox, Johnson Co. Aud. |
| Ind., Portland | | 10 a.m., Aug. | 3..Grading and paving..... | John Bonifas, Jay Co. Aud. |
| Ind., Salem | | Aug. | 3..Grading and paving..... | Frank S. Munkelt, Washington Co. Aud. |
| Ind., Vevay | | 1 p.m., Aug. | 3..Grading and paving..... | John W. Smith, Switzerland Co. Aud. |
| Ind., Newport | | 10 a.m., Aug. | 3..Grading and paving..... | Roy Slater, Vermilion Co. Aud. |
| Ind., Rensselaer | | 2 p.m., Aug. | 3..Grading and paving..... | J. P. Hammond, Jasper Co. Aud. |
| Ala., Seale | | Aug. | 3..Nine miles sand clay..... | W. S. Keeler, State Highway Eng., Montgomery, Ala. |
| Ind., Columbia City | | Aug. | 3..Three roads..... | County Commissioners. |
| Ind., Ft. Wayne | | Aug. | 3..Macadam and stone road..... | County Commissioners. |
| Ind., Hartford City | | Aug. | 3..Four roads..... | County Commissioners. |
| O., Defiance | | 2 p.m., Aug. | 3..Grading, macadamizing and paving with waterbound or glutrin-bound macadam..... | Roger Daoust, Clk. Defiance Co. Comrs. |
| Ind., Kentland | | 2 p.m., Aug. | 3..Stone road..... | S. R. Sizelove, Newton Co. Aud. |
| Ind., South Bend | | 11 a.m., Aug. | 3..Gravel road improvement..... | Clarence Sedgwick, Aud. St. Joseph Co. |
| Cal., Oakland | | 10 a.m., Aug. | 3..Repairing..... | Jno. P. Cook, Clk. Bd. Supv., Alameda Co. |
| Wyo., Sheridan | | Aug. | 3..Paving with any one of standard bitulithic, gravel bitulithic, creosoted wood blocks, brick, granite blocks or asphalt..... | City Clerk. |
| Tex., Temple | | 10 a.m., Aug. | 3..Roads and culverts..... | W. E. Hall, Co. Aud. |
| N. H., Concord | | 1 p.m., Aug. | 3..Grading and gravelling..... | S. P. Hooper, State Supt. of Hwys. |
| N. J., Plainfield | | 8 p.m., Aug. | 3..Macadamizing..... | Jas. T. MacMurray, City Clerk. |
| Fla., DeLand | | Aug. | 3..Six miles hard surface shell road, \$50,000..... | C. W. Fisher, Chr. Volusia Co. Commissioners |
| Miss., Grenada | | Aug. | 3..14,000 sq. vds. paving with vit. brick, wood block, conc. & bitulithic, 4,000 ft. conc. curb & grading..... | L. D. James, City Rec. |
| Miss., Laurel | | Aug. | 3..14 miles streets and roads..... | T. G. McCallum, Chr. Jones Co. Comrs. |
| Tex., Belton | | Aug. | 3..40 miles gravel roads, \$105,000..... | See & Smith, Engrs., Temple |
| N. J., Perth Amboy | | 8.30 p.m., Aug. | 3..Curbing and grading..... | City Surveyor |
| O., Defiance | | Aug. | 3..Grading, gravelling and macadamizing; water-bound macadam; glutrin-bound macadam and gravel..... | County Comrs. |
| Cal., Tulare | | Aug. | 3..\$60,000 paving..... | E. Oakford, City Clk. |
| Miss., Vicksburg | | Aug. | 3..Brick reinforced concrete or asphalt macadam..... | Village Clerk. |
| Mich., Sturgis | | 7 p.m., Aug. | 3..22,075 sq. vds. brick or asphalt block and 11,300 lin. ft. combined curb and gutter..... | G. E. Swihart, City Clk. |
| Pa., Mt. Pleasant | | 8 p.m., Aug. | 3..Vitrified brick paving and stone curbing..... | J. E. Criswell, Sec. Town Road. |
| Ind., Lafayette | | Aug. | 3..Cement sidewalk..... | H. B. Frankenbury, Boro. Sec. |
| Pa., Pt. Marion | | 7 p.m., Aug. | 3..Grading, curbing portion of street..... | H. N. Whitbeck, Twn. Clk. |
| Pa., Sharon | | Noon, Aug. | 3..Grading, draining, culverting and paving..... | J. F. Beatty, Boro. Sec. |
| Pa., Greensburg | | 8 p.m., Aug. | 3..Grading, curbing and paving..... | P. C. Harding, City Engr. |
| Mo., Jefferson | | 8 p.m., Aug. | 3..Macadamizing with asphalt binder, grading, also curbing and guttering with cement..... | C. E. Ashburner, City Mgr. |
| O., Springfield | | Noon, Aug. | 3..Improving one street with various materials..... | H. Johnson, Co. Judge. |
| Tex., Ft. Stockton | | 1 p.m., Aug. | 3..Improving about 250 miles of highway..... | A. P. Greenacre, Clerk. |
| Colo., Ft. Collins | | 10 a.m., Aug. | 4..Excavating and grading..... | Chas. J. Filian, Engr. |
| Wash., Port Angeles | | Aug. | 4..Grading and pile trestle, \$22,000..... | C. R. Holstrom, Vil. Recorder. |
| Minn., Columbia Hgts. | | 8 p.m., Aug. | 4..270 yds. of cement sidewalk..... | J. S. E. Green, Boro. Clk. |
| N. J., Woodlynne | | 8 p.m., Aug. | 4..Cement sidewalks and curb..... | J. K. Denham, Sec. Hwy. Commissioners |
| Miss., Hattiesburg | | Noon, Aug. | 4..Improving 5 1/2 miles of streets..... | |

BIDS ASKED FOR

| STATE | CITY | REC'D UNTIL | NATURE OF WORK | ADDRESS INQUIRIES TO |
|---------------------|------------------|--|---|----------------------|
| Va., Lebanon | Aug. | 4..3½ miles macadam | D. P. Coleman, State Hwy. Comr., Richmond | |
| Miss., Sidon | Aug. | 4..Concrete sidewalks | Berry D. Brown, St. Comr. | |
| Fla., Fort Pierce | Aug. | 4..5½ miles marl hard surface roads | J. E. Fultz, Clk. Co. Comrs. | |
| Ind., Brazil | Aug. | 4..Macadam roads | E. A. Staggs, Clay Co. Aud. | |
| O., Toledo | 10:30 a.m., Aug. | 4..Improving eight county roads, aggregating 19 miles | C. J. Sanzenbacher, Co. Aud. | |
| O., Massillon | Aug. | 4..Paving one road, cost about \$100,000 | State Hwy. Dept., Columbus | |
| O., Marion | Noon, Aug. | 4..Paving one street | A. C. Cass, Dir. Pub. Service. | |
| N. Y., Yonkers | Aug. | 4..Widening avenue | Board Contract & Supply. | |
| Ind., Boonville | 10 a.m., Aug. | 4..Rock road | N. M. Spragley, Warwick Co. A. | |
| Ind., Logansport | Aug. | 4..Five roads | County Commissioners. | |
| O., Youngstown | Aug. | 4..Grading and paving water bound macadam, bridges and culverts, 15,094 feet | State Hwy. Comr., Columbus. | |
| O., Columbus | 2 p.m., Aug. | 4..2.37 miles surfacing with tar and screenings | Jas. R. Marker, State Hwy. Comr. | |
| Conn., Norwalk | Aug. | 4..Vitrified or wood block pavement | Sec. Bridge Construction Co. South Norwalk. | |
| Md., Baltimore | Noon, Aug. | 4..42.18 miles state highway in ten sections, resurfacing; sheet asphalt and granite block; macadam or concrete 5 sections; macadam concrete or gravel and gravel surfacing | J. E. Weller, Chm. State Road Comm. | |
| O., Fremont | Aug. | 4..Waterbound macadam | J. R. Marker, State Hwy. Commissioner, Columbus. | |
| O., Carrollton | 2 p.m., Aug. | 4..7,400 ft. waterbound macadam | J. R. Marker, State Hwy. Commissioner, Columbus. | |
| O., Van Wert | 2 p.m., Aug. | 4..8,300 ft. and 5,300 ft. waterbound macadam | J. R. Marker, State Hwy. Commissioner, Columbus. | |
| O., Zanesville | 2 p.m., Aug. | 4..9,650 ft. brick and concrete | J. R. Marker, State Hwy. Commissioner, Columbus. | |
| Ind., Washington | 2 p.m., Aug. | 4..Four pike roads | Lew. S. Core, Daviess Co. Aud. | |
| Ind., Knox | Noon, Aug. | 4..Grading and paving | T. W. Weninger, Starke Co. A. | |
| Ind., Columbus | 10 a.m., Aug. | 4..Grading and paving | P. J. Slater, Bartholomew Co. Aud. | |
| N. Y., Newburgh | 5 p.m., Aug. | 4..Paving with either asphalt block, bitulithic or vit. brick, 8,265 sq. yds.; 3,570 lin. ft. of curbing | Wm. J. Blake, Jr., City Engr. | |
| Colo., Denver | 11 a.m., Aug. | 4..Grading, including 12,000 cu. yds. excavation | State Hwy. Comm. | |
| Utah, Fairview | 8 p.m., Aug. | 4..Cement sidewalks | J. L. Bench, Jr., City Engr. | |
| N. J., Rahway | 8 p.m., Aug. | 4..6,150 sq. yds. paving on 6-inch concrete base | Franklin Marsh, City Engr. | |
| Ind., Winamac | Aug. | 4..2¼ miles mac. rd., \$10,000, & 2 miles gravel rds., \$6,000 | C. E. Paul, Co. Surv. | |
| O., Lorraine | Noon, Aug. | 4..Pav. with vitrified brick, sheet asphalt or block asphalt | Director Public Service | |
| Neb., Omaha | 9 a.m., Aug. | 4..Paving and curbing nine streets | Thomas J. Flynn, City Clk. | |
| Neb., Grand Island | 8 p.m., Aug. | 5..8,311 yds. paving including false curbing and gutter plates; cost \$17,558, and 870 ft. of curbing, cost \$278 | H. E. Clifford, City Clk. | |
| Mich., St. Joseph | 5 p.m., Aug. | 5..Grading and paving one street | L. Fillehr, City Clk. | |
| Ind., Muncie | 10 a.m., Aug. | 5..Gravel road | F. M. Williams, Co. Aud. | |
| Ind., Crownpoint | 1 p.m., Aug. | 5..Six gravel roads | Edward Simon, Co. Aud. | |
| Ind., Kokomo | 10 a.m., Aug. | 5..Grading and paving | E. B. Swift, Howard Co. Aud. | |
| Conn., Norwalk | 2 p.m., Aug. | 5..Vitrified brick or wood block paving for bridge | A. F. Beard, Chr. Bridge Comm. | |
| Md., Cumberland | Aug. | 5..Five miles of road | J. T. Edwards, Pres. Road Dir., Allegheny Co. | |
| N. Y., Schenectady | Aug. | 5..Paving streets | Board Contract & Supply. | |
| O., Ottawa | Aug. | 5..5,581 sq. yds. paving | City Clk. | |
| Wis., Eau Claire | 2 p.m., Aug. | 5..3,700 yds. brick pavement on concrete base | J. C. Fennessy, City Clk. | |
| Ind., Harrison | 10 a.m., Aug. | 5..Gravel roads | F. M. Williams, Del. Co. Aud. | |
| Ind., Shelbyville | 11 a.m., Aug. | 5..Grading, draining and gravelling | W. Fagel, Shelby Co. Aud. | |
| Minn., St. Paul | 2 p.m., Aug. | 6..Excavating machinery, fitted with orange peel bucket | C. L. Potter, Lieut.-Col. Engr. U. S. A. | |
| Ia., Dubuque | 8 p.m., Aug. | 6..Paving with cement concrete, 570 sq. yds. | J. J. Shay, City Rec. | |
| O., Mt. Gilead | 11 a.m., Aug. | 6..Road repair | C. O. Higgins, Morrow Co. Aud. | |
| Pa., Indiana | Aug. | 6..Paving bridge floor with blocks | County Comrs. | |
| Fla., Miami | Aug. | 6..95,000 sq. yds. asphaltic conc., vit. brick, bitulithic, creosoted wood block & asphaltic block pavement | B. H. Klyce, Engineer | |
| Fla., Tampa | 11 a.m., Aug. | 6..Four roads: 128,000 sq. yds. brick, 154,294 ft. granite; 46,500 sq. yds. brick, 93,000 wood curb; 52,800 sq. yds. brick, 135,600 ft. curb; 25,000 sq. yds. brick, 20,100 ft. curb | James Ribble, Engr. of Rds. | |
| Ind., Evansville | 10 a.m., Aug. | 6..Grading and paving | T. B. Beard, Vanderburgh Co. Aud. | |
| Ind., New Albany | 10 a.m., Aug. | 7..Grading and paving, two jobs | J. T. Miller, Floyd Co. Aud. | |
| N. Y., Watertown | 8 p.m., Aug. | 7..Concrete curb and gutter | E. W. Sayles, City Engr. | |
| Ia., Iowa City | 2 p.m., Aug. | 7..42,000 sq. yds. brick, sheet asphalt and bitulithic | Geo. T. Reddick, City Clk. | |
| Tenn., Clarksville | Noon, Aug. | 7..7¾ miles road. Improving 10,000 cu. yds. mac. surface | County Road Comm. | |
| Wis., Harrisonville | Aug. | 7..5,445 sq. yds. brick on conc. base, 600-ft. conc. curb, \$10,000 | Geo. Bird, City Engr. | |
| Mo., St. Louis | Aug. | 7..Road improvements, wood block paving and sidewalks | Board Public Imp. | |
| Ind., Bloomfield | 2 p.m., Aug. | 7..Construction | C. H. Jennings, Greene Co. A. | |
| O., Cincinnati | Noon, Aug. | 7..Repairing | Fred E. Wesselmann, Pres. Bd. Co. Comrs. | |
| Pa., Hokenbauqua | Noon, Aug. | 7..Cement paving | Thompson Porter, Jr., Sec. School Dir. Whitehall Twp. | |
| W. Va., Parkersburg | About Aug. | 7..Four miles of concrete road; cost about \$40,000 | S. F. Shaw, Engr. | |
| Wis., Burlington | Aug. | 8..Paving and making sewer extension | City Clk. | |
| N. J., Hammonton | 8 p.m., Aug. | 8..19,041 lin. ft. concrete curb, 29,080 sq. ft. conc. sidewalks | W. R. Seely, Town Clk. | |
| O., Tippecanoe City | Noon, Aug. | 8..Brick paving | S. O. Mitchell, Vil. Clerk. | |
| Ind., Valparaiso | 2 p.m., Aug. | 8..Grading and paving | C. A. Blachley, Porter Co. Aud. | |
| Ia., Corydon | Aug. | 10..31,000 yds. paving, curbing, etc., brick, asphaltic concrete and concrete considered | A. T. Gallagher, City Clk. | |
| Cal., Sacramento | Aug. | 10..Grading and concrete paving, several roads | State Hwy. Commission. | |
| Wis., La Crosse | Aug. | 11..6,000 sq. yds. asphaltic macadam with concrete curb and gutter | W. J. Fries, City Cont. | |
| O., Ottawa | Aug. | 11..5,851 sq. yds. paving. Alternate bids | City Clerk | |
| N. Y., Albany | Aug. | 11..Road improvement in Pendleton | State Highway Comm. | |
| Fla., Fernandina | Aug. | 12..Clearing & grading. Hire of 5-7-ton steam or gas roller | J. W. Keen, Chr. Bd. County Commissioners | |
| Wis., Green Bay | Aug. | 12..Grading and asphalt on concrete foundation | A. Brauns, City Engr. | |
| Tex., Ft. Bliss | Aug. | 13..Roads, walks, gutters and drains | Cap. W. E. Hunt, Depot Q. M. El Paso. | |
| Wis., Monroe | Noon, Aug. | 13..1,321 ft. combined curb and gutter | W. Dunwidie, City Clk. | |
| Tex., Ft. Stockton | Aug. | 13..250 miles of road | Whitaker & Washington, Engineers | |
| O., Cincinnati | Noon, Aug. | 14..Grading, 1,800 feet | Fred E. Wesselmann, Pres. Hamilton Co. Comrs. | |
| O., Uhrichsville | Noon, Aug. | 15..Grading, draining and curbing | H. A. Snyder, Vil. Clk. | |
| O., New Lexington | Noon, Aug. | 17..Grading with brick and otherwise improving street | T. V. Skinner, Vil. Clk. | |
| O., Portsmouth | Noon, Aug. | 17..Grading and curbing in two townships | T. C. Patterson, Co. Aud. | |
| Ala., Eutaw | Aug. | 17..Grading, draining & surfacing with chirt | W. S. Keller, State Hwy. Engr., Montgomery | |
| Ala., Marion | Aug. | 18..Grading, draining and surfacing with gravel | W. S. Keller, State Hwy. Engr., Montgomery | |
| Ala., Centerville | Aug. | 19..Grading, draining and surfacing with chirt | W. S. Keller, State Hwy. Engr., Montgomery | |

BIDS ASKED FOR

| STATE | CITY | REC'D UNTIL | NATURE OF WORK | ADDRESS INQUIRIES TO |
|-------|------------|------------------|--|--|
| N. C. | Mooreville | Aug. 24 | 9,000 yds. bituminous paving, concrete base and curb | Alali Osborne, Engr., Charlotte |
| Ind. | Newport | 10 a.m., Aug. 31 | Gravel road | Roy Slater, Co. Aud. |
| Ind. | South Bend | 11 a.m., Aug. 31 | 13,200 ft. gravel road | Clarence Sedgwick, Aud. St. Joseph Co. |

SEWERAGE

| | | | |
|-------------------------------|-----------------|---|--|
| Wis., Appleton | 9 p.m., Aug. | 1. Sewer | E. L. Williams, City Clk. |
| La., Baton Rouge | Noon, Aug. | 1. 36,000 lin. ft. vit. pipe sewer, c. i. pipe, flush tanks and manholes | J. J. Mundiger, City Engr. |
| O., Miamisburg | Aug. | 1. Storm water sewers | Village Clerk. |
| N. Y., Oneonta | Aug. | 1. Storm and sanitary sewers, \$8,000 | F. M. Gurney, City Engr. |
| Wis., West Allis | Aug. | 1. Lateral sewers in 13 streets | A. R. Obert, City Engr. |
| La., Guthrie Center | Aug. | 1. Sewers and sewage disposal plant | S. B. Weeks, City Clerk |
| Pa., So. Renova, Renova P. O. | Aug. | 1. 1 1/2 miles sewer | Ambrose Beck, Clk. Council |
| Minn., Brainerd | 8 p.m., Aug. | 3. 2,884 ft. 8-inch sewer; 1,830 ft. 8, 10 and 12-inch sewer | City Clerk. |
| La., Perry | 8 p.m., Aug. | 3. 2,400 ft. 8-in. sewer | Chas. D. Wilson, Engr. |
| Ill., Chicago | 11 a.m., Aug. | 3. Drains and sewers | Geo. A. Schilling, Pres. B. L. I. |
| Wis., New Glarus | Aug. | 3. 2,960 ft. 10 to 5-in. vit. pipe sewer and 7,961 sq. yds. reinforced concrete paving with 1,065 ft. curb and gutter | W. G. Kichoffer, Engr., Brown Block, Madison. |
| O., Salem | Aug. | 3. Constructing sewers | D. M. French, City Engr. |
| Pa., Williamsport | 10 a.m., Aug. | 3. Constructing several sewers with appurtenances | Supt. Sts. |
| Minn., Duluth | 10 a.m., Aug. | 3. Constructing sanitary sewers | Comr. Pub. Wks. |
| N. Y., Charlotte | 7 p.m., Aug. | 3. Constructing several sewers | W. E. Hogan, Clk. |
| Wis., Fond Du Lac | 3 p.m., Aug. | 3. Sanitary sewer on several streets | City Clerk. |
| La., Perry | 8 p.m., Aug. | 3. 2,400 ft. 8-in. sewer, 2 manholes, 3 flush tanks, 2 lamp holes | Chas. N. Wilson, City Engr. |
| Mo., Hannibal | 5 p.m., Aug. | 3. Sewers, manholes and lampholes. (See proposal ad) | W. H. Youse, City Clk. |
| Ill., Geneva | 3 p.m., Aug. | 3. Sewage settling tank | Thomas O'Connor, Fiscal Sup. Bd. Administration State Girls' Training School, Springfield. |
| Ind., Crawfordsville | Aug. | 3. 965 ft. of 8-inch vitrified pipe sewers | J. A. Cragwall, City Clk. |
| Ill., Berwin | 8 p.m., Aug. | 4. Sewers in one street, cost \$3,640 | O. M. Lindahl, Sec. Bd. L. I. |
| Minn., Fairmont | Aug. | 4. Judicial ditches, 5 jobs | H. C. Nolte, Co. Aud. |
| Miss., Belzoni | Aug. | 4. Three miles vitrified pipe sewer, 8-12 inches | Mayor. |
| Ont., Toronto | Aug. | 4. Storm sewers | Chairman Board Control. |
| N. J., Bridgeton | 8 p.m., Aug. | 4. Furnishing and laying about 1,612 ft. of 8-in. sewer pipe | J. B. Jones, City Clk. |
| Minn., Thief River Falls | 8 p.m., Aug. | 4. 380 of 8-in. sewer pipe, and one manhole | E. J. Overland, City Clk. |
| La., Dversville | 8 p.m., Aug. | 4. 6,320 ft. 6, 8 and 10-in. vit. pipe sewer | W. C. Loosdrock, Twn. Clk. |
| Mo., St. Louis | Aug. | 5. Sewers | Board Public Imp. |
| Wis., Wausau | Noon, Aug. | 5. Sewer construction | G. Ruder. |
| S. D., Huron | 5 p.m., Aug. | 5. 4,500 ft. of 8, 10 and 12-inch sewer | S. S. Oviatt, City Aud. |
| Wis., Blanchardville | 6 p.m., Aug. | 5. Sanitary sewer | C. H. Buckingham, Vil. Clk. |
| Mo., Charleston | 7 p.m., Aug. | 6. Sewer system, sewage treatment works and water works | O. W. Joslyn, Mayor. |
| La., Ft. Dodge | 1.30 p.m., Aug. | 6. Drains, two jobs | J. L. Hanrahan, Co. Aud. |
| N. Y., Watertown | 8 p.m., Aug. | 7. 8-inch tile sanitary sewer | E. W. Sayles, City Engr. |
| Wis., West Allis | Noon, Aug. | 8. Laying sewer pipe in various streets | Ed. Pub. Works. |
| O., Akron | Noon, Aug. | 11. Sewage treatment plant, including screen & grit chamber, conc. sedimentation tanks, pumps, pump house & well | R. Winthrop Pratt, Cons. Eng., Cleveland |
| Man., The Pas | 6 p.m., Aug. | 11. Two sewage lift pumps, house meters, construction of sewage lift chamber and oil tank chamber | H. H. Elliott, Secy. |
| O., Sandusky | Aug. | 14. Constructing one mile ditch | L. A. Schultz, Engr. |
| La., Chariton | 2 p.m., Aug. | 14. Sewer system consisting of 18 1/2 miles, 8 to 30-inch sewer pipe and four disposal plants | T. J. Gittinger, City Clk. |
| Minn., Warroad | 8 p.m., Aug. | 27. Constructing sewers | Council. |

WATER SUPPLY.

| | | | |
|----------------------|------------------|--|---|
| Va., Norfolk | Aug. | 1. 5,300 meters | Board of Control. |
| Wyo., Casper | Aug. | 1. \$70,000 water works | C. C. Carlisle, Engr., Cheyenne |
| Sask., Prince Albert | 1 p.m., Aug. | 1. C. i. & steel wtr. pipe, castings, gate valves & hydrants | K. V. Brown, City Clerk |
| Ind., Hartford | 7.30 p.m., Aug. | 1. Roofs for water reservoir | Ed. McEldowney, City Clk. |
| S. D., Ipswich | 8 p.m., Aug. | 3. Water works extensions | I. J. Commerce, City Aud. |
| D. C., Washington | 10.30 a.m., Aug. | 3. Cast-iron pipe fittings, Venturi meters, etc. | U. S. Pur. Agts., 24 State St., New York City. |
| Mich., Wyandotte | 7.30 p.m., Aug. | 3. Two 250 h. p. wtr. tube boilers, mechanical stokers, one 500 k. w. generating unit condensor, boiler house, etc. | C. H. Block, City Clerk |
| La., Lake City | 8 p.m., Aug. | 3. 4-inch water pipe | A. H. Fickel, City Clerk |
| Neb., Ansley | Aug. | 3. Pumping equipment and concrete construction | Martz Engrg. Co., Lincoln. |
| Mont., Havre | 8 p.m., Aug. | 3. Water mains extension | S. L. Hanley, Engr. |
| Tex., New Boston | Aug. | 3. Water works system | City Council. |
| Ill., Lockport | Aug. | 3. 100,000 gallon standpipe | City Council. |
| Ont., Orillia | 9 p.m., Aug. | 3. Motor-driven turbine pumps and equip., furnish and erect Diesel oil engine, mechanical pressure filtration plant | Water & Light Comm. |
| Tex., San Antonio | Aug. | 3. Two 5-million pumps and steam turbine condensers, also 250 h. p. boilers | San Antonio Water Sup. Co. |
| Tex., New Boston | 8 p.m., Aug. | 3. Water works system, including battery of shallow wells, two oil engines, triplex pump and power house | O. H. Proctor, City Clk. |
| Ill., Waukegan | 8 p.m., Aug. | 3. Laying c-i. pipe, fire hydrants, valves, etc., also sewer | J. F. Biding, Pres. B. L. I. |
| Mont., Great Falls | 2 p.m., Aug. | 4. Regulator gates, gate frames, gate stands, etc. | U. S. Reclam. Service, Wash. D. C. |
| Fla., Jacksonville | 8 p.m., Aug. | 4. 30,000 lbs. of soft blue pig lead for joining c-i. pipe | Bd. Bond Trustees. |
| Minn., Chisholm | Aug. | 4. Million-gallon mechanical filter unit | C. J. Sullivan, Supt. |
| Ind., Rochester | 2 p.m., Aug. | 4. Pneumatic water system | W. C. Miller, Co. Aud. |
| Tex., Beaumont | Aug. | 4. Manifold systems, strainers & air-wash systems in six 500,000-gal. gravity filters | Burns & McDonnell, Cons. Engrs., Kansas City, Mo. |
| N. Y., Schenectady | Aug. | 5. 20,000,000-gallon covered reservoir | Board Contract & Supply. |
| La., Knoxville | 8 p.m., Aug. | 5. Supplying quantity of c-i. pipe, and erecting extension to water works system as per proposal ad. | D. G. Fisher & Co., Engr., Davenport. |
| Kan., Enterprise | Noon, Aug. | 5. 5,500 ft. 4-inch water main | Rav E. Corbin, City Clk. |
| Tex., Quanah | 5.30 p.m., Aug. | 5. Cast-iron water pipe, etc. | J. B. Robertson, City Sec. |
| Mo., Charleston | 7 p.m., Aug. | 6. Water works including 6 miles 4-8-in. c-i. water pipe oil-driven triplex pumps, etc. | O. W. Joslyn, Mayor. |
| Pa., Pittsburgh | Aug. | 6. 8, 10, 12 and 20-in. c-i. pipe and 42 and 48-in. riveted steel pipe | City Controller. |
| Kan., Alton | Aug. | 6. Water works system including 4,600 ft. 6-in. 11,000 ft. 4-in. c. i. pipe, well, 50,000-gal. tank, 7x8 triplex pump | Rallins & Co., Engrs., Kansas City, Mo. |
| O., Norwood | Aug. | 7. Water works and light plant, \$52,000 | Walter G. Franz, C. E., Cincinnati |
| Wash., Seattle | 10 a.m., Aug. | 7. 5,000 water meters (may be increased to 10,000), sizes: 1/2-in., 3/4-in., 1-in. and 1 1/2-in. and 2-in. and 3-in. and 4-in. | C. R. Bagley, Sec. R. P. W. |
| O., Delta | Noon, Aug. | 10. Extension water works plant | A. R. Thomson, Village Clk. |
| Ill., Rock Island | Aug. | 10. 6,000,000-gallon motor-driven centrifugal pump | W. T. Treichler, City Engr. |

BIDS ASKED FOR

| STATE | CITY | REC'D UNTIL | NATURE OF WORK | ADDRESS INQUIRIES TO |
|---------------------------|--------------------|--|--|----------------------|
| Pa., Weatherly..... | Aug. 10. | 50-foot concrete spillway..... | S. G. Eby, Sec. Water Co. | |
| Ill., Pekin..... | 10 a.m., Aug. 12. | Steel tank | Alvord & Burdick, Engrs., Hartford Bldg., Chicago | |
| Wis., West Allis..... | Aug. 12. | Water mains and hydrants..... | Board Public Works | |
| Minn., Pennock | 8 p.m., Aug. 12. | Water works system complete..... | G. C. Haug, Vil. Pres. | |
| Ill., Aurora | 5 p.m., Aug. 14. | Drilling and casing deep well..... | Com. on Supplies. | |
| Sask., Prince Albert..... | 1 p.m., Aug. 15. | 2,500 gals. per min. pump & motor, & 14-in. Venturi meter..... | J. B. Brown, City Clerk | |
| Ont., Toronto | noon, Aug. 18. | Installation of coal and ash handling apparatus at main pumping station..... | Mayor H. C. Hocken, Chr. Bd. Control. | |
| Neb., Dalton..... | Aug. 27. | Constructing water works, cost \$7,200..... | J. L. Willis, Village Clk. | |
| Man., Winnipeg | Sept 19. | .84 miles of aqueduct, \$8,729,000..... | Greater Winnipeg Water Dist. | |
| LIGHTING AND POWER. | | | | |
| O., Mansfield..... | Aug. 1. | Furnishing electric light for city..... | O. Hursh, Dir. of Service | |
| la., Denison | Aug. 1. | Constructing municipal lighting plant..... | J. B. Hill, Engr. | |
| S. D., Alexandria | Aug. 1. | Constructing municipal electrical lighting system..... | H. M. Shoemaker, City Aud. | |
| La., New Orleans | Aug. 3. | Electric signal system in the United States Mint..... | Supervising Architect, Treas- ury Dept., Washington, D. C. | |
| Cal., San Francisco..... | Aug. 3. | Electric signal system in Sub-treasury..... | Supervising Architect, Treas- ury Dept., Washington, D. C. | |
| Mich., Three Rivers..... | Aug. 3. | Mechanical equipment, lighting fixtures, etc., for Post- Office | Supervising Architect, Treas- ury Dept., Washington, D. C. | |
| Ill., Perior | Aug. 3. | Electric signal in Post-Office | Supervising Architect, Treas- ury Dept., Washington, D. C. | |
| Mich., Wyandotte..... | 7.30 p.m., Aug. 3. | Water & light plant. See under water..... | Chas. H. Block, City Clerk | |
| Mont., Havre | 8 p.m., Aug. 3. | Constructing lighting system, 28 single lamp-posts and 4,000 ft. armored cable..... | S. L. Hanley, City Engr. | |
| N. D., Stanley | Aug. 3. | Plumbing, heating and ventilating court house..... | Co. Auditor. | |
| Va., Wytheville | Aug. 4. | Mechanical equipment, lighting system and approaches in Post-Office | Supervising Architect, Treas- ury Dept., Washington, D. C. | |
| D. C., Washington | Aug. 5. | Material for two 44,000-volt sub-stations on Panama Canal | General Pur. Officer, Isthmian Canal Comm. | |
| Ind., Gary | Aug. 6. | Mechanical equipment, lighting fixtures and approaches (included in construction) | Supervising Architect, Treas- ury Dept., Washington, D. C. | |
| Sask., Cupar | Aug. 7. | Furnishing material and constructing telephone system..... | John Donald, Sec.-Treas. | |
| Minn., Red Wing..... | 5 p.m., Aug. 7. | Curb lighting system | City Clerk. | |
| N. Y., Farmingdale..... | 10 a.m., Aug. 8. | Power house for state school..... | F. W. Hooper, Sec. Bd. Trus., 30 Lafayette Av., Bkln., N.Y. | |
| Ill., Rock Island | 2 p.m., Aug. 10. | Centrifugal pumping unit..... | M. T. Rudgren, City Clk. | |
| FIRE EQUIPMENT. | | | | |
| Wis., Weyauwega | Noon, Aug. 1. | Combined engine house and village hall..... | W. H. Robertson, Vil. Clk. | |
| Ill., Rock Island | 2 p.m., Aug. 3. | Fire station, and 3,000 ft. cotton rubber-lined hose..... | M. T. Rudgren, City Clk. | |
| O., Middletown | Aug. 6. | 2 motor combination wagons, 1 motor police patrol, and two motorcycles | John Kunz, City Clk. | |
| Ont., Toronto..... | Noon, Aug. 11. | Motor-driven fire apparatus and hose..... | Mayor H. C. Hocken | |
| BRIDGES. | | | | |
| O., Hamilton | Aug. 1. | Bridge | Wm. W. Crawford, Co. Aud. | |
| Tex., Dallas | Aug. 1. | Three bridges, \$50,000..... | Chas. E. Gross, Co. Aud. | |
| O., Woodside | Aug. 1. | Steel or concrete bridge | F. M. Hammerlee, Co. Surv. | |
| Ill., Carlton | 10 a.m., Aug. 1. | Reinforced concrete bridge..... | Ill. Hwy. Comm., Springfield. | |
| Wash., Seattle | Aug. 1. | Bridge | Bd. County Comrs. | |
| Ky., Whitesburg | Aug. 3. | Three bridges | Judge County Court. | |
| Ind., Rensselaer | 2 p.m., Aug. 3. | Bridges and repairs..... | J. P. Cummins, Co. Aud. | |
| Ind., Greenfield..... | 10 a.m., Aug. 3. | Bridge and repairs..... | Lawrence Wood, Co. Aud. | |
| O., Ashland | Aug. 3. | block of concrete floor..... | Co. Comrs. | |
| O., Delaware | Noon, Aug. 3. | Superstructure | W. V. Aldrich, Del. Co. Aud. | |
| O., Columbus | 2 p.m., Aug. 4. | Constructing bridges and culverts | J. R. Marker, St. Hwy. Engr. | |
| Ind., Boonville | Aug. 4. | 14 bridges | County Commissioners. | |
| N. D., Mohall | 2 p.m., Aug. 4. | Bridges | Peter Carlson, Co. Aud. | |
| Wash., Burlington | Aug. 4. | Bridge | County Commissioners. | |
| Del., Wilmington | Noon, Aug. 4. | Reinforced concrete bridge..... | Jas. Wilson, Co. Engr., New Castle Co. | |
| Mo., Kahoka | Noon, Aug. 5. | Two cement piers for bridge..... | W. Kier, Hwy. Engr. | |
| O., Mt. Gilead | Aug. 7. | Bridges | C. O. Higgins, Co. Aud. | |
| O., Youngstown..... | Aug. 7. | Concrete bridge | F. M. Lillie, City Engr. | |
| O., Marietta | Noon, Aug. 7. | Bridges | W. B. Alexander, Wash. Co. Aud. | |
| O., Marion | Noon, Aug. 8. | Substructure | Marion Co. Comrs. | |
| O., Coshocton | 1 p.m., Aug. 8. | Constructing several culverts, bridges and repairing abut- ments | F. C. McCullough, Co. Aud. | |
| N. J., Camden | 11 a.m., Aug. 10. | Constructing bridges | F. W. Gercke, Chm. Bridge Com. | |
| O., Zanesville | 1 p.m., Aug. 10. | Increasing height and raising bridge..... | Fred. C. Werner, Muskingum Co. Clk. | |
| Fla., Jacksonville | 3 p.m., Aug. 10. | Reinforced concrete bridge..... | Geo. M. Powell, Chm. Com. Pub. Wks. | |
| Pa., Wyoming | Noon, Aug. 11. | Constructing one bridge | F. R. Hendershot, Controller. | |
| O., Youngstown..... | 10 a.m., Aug. 12. | Abutments | Frank H. Vogan, Clk. Co. Commissioners | |
| O., Hamilton..... | 10 a.m., Aug. 12. | Concrete steel bridge..... | W. W. Crawford, Co. Aud., Butler Co. | |
| Kan., Linsborg | Aug. 12. | \$16,000 bridge | J. W. Quinn, Co. Clk., McPherson. | |
| Ont., Toronto | Aug. 15. | Concrete or steel viaduct..... | Board of Control. | |
| Tex., Corpus Christi..... | Aug. 17. | 8,500 ft. concrete causeway..... | Bartlett & Renney, San An- tonio, Cons. Engrs. | |
| Pa., Uniontown..... | noon, Aug. 17. | Bridge with concrete abutments..... | Co. Road Engr., Fayette Co. | |
| Wash., Seattle | Aug. 31. | Bridge | County Comrs. | |
| Cal., Senora | Sept. 7. | Concrete bridge | E. E. Newell, Tuolumne Co. Sur. | |
| MISCELLANEOUS. | | | | |
| Fla., Jacksonville | 3 p.m., Aug. 3. | 125 all-metal four-ways street signs..... | Bd. Bond Trustees. | |
| Fla., Jacksonville | 3 p.m., Aug. 3. | 500 auto to. signs | Geo. M. Powell, Chm. Com. Pub. Wks. | |
| Fla., Jacksonville | 8 p.m., Aug. 4. | 30,000 lbs. soft blue pig lead for adjoining water pipe... | R. M. Ellis, Pur. Agt., Board Trustees | |
| Ind., Gary | 3 p.m., Aug. 6. | Constructing two-story post office..... | O. Wenderoth, Sup. Architect, Treasury Dept., Washington | |
| Cal., San Francisco | Aug. 19. | 12,000 ft. tunnel | J. Churchill, Sec. Bd. P. W. | |

STREETS AND ROADS

Harrison, Ark.—Plans to build modern highway connecting Harrison and Jasper have been launched at meeting of Commercial Club.

Pomona, Cal.—At regular meeting of city council following bids were opened for paving which is to be contracted for by city: Henry M. Hanawalt, Lordsburg: North Garey Ave.—Paving, \$11,135; culvert, \$400; total, \$11,535. Arthur S. Bent Construction Co.: North Garey Ave.—Paving, 17c. per sq. ft.; South Garey Ave.—Paving 17c. per sq. ft.; West Second St.—Paving 18c. per sq. ft.; East Holt Ave.—Paving 21c. per sq. ft.; San Antonio Ave.—Paving 16½c. per sq. ft.; culverts, \$1,525. George S. Oswald: South Garey Ave.—Paving 12½c. per sq. ft.; East Holt Ave.—Paving 12½c. per sq. ft.; Lordsburg road—Paving 12½c. per sq. ft.; culvert, \$375.50; North Garey Ave.—Paving 12½c. per sq. ft.; culverts, \$3,090; West Second St.—Paving 12½c. per sq. ft.; culverts, \$1,560.50; San Antonio Ave.—Paving 11.9c. per sq. ft. H. E. Cox: San Antonio Ave.—Paving 14.8c. per sq. ft.; North Garey Ave.—Paving 14.5c. per sq. ft.; culverts, \$2,590. Highway Construction Company: Lordsburg road—Paving 14.8c. per sq. ft.; culverts, \$2, per lineal ft.; South Garey Ave.—Paving 13.7c. per sq. ft.; East Holt Ave.—Paving 14.7c. per sq. ft.; North Garey Ave.—Paving 13.7c. per sq. ft.; culverts, \$5 per lineal ft.; West Second St.—Paving 14.9c. per sq. ft.; culverts, \$3 per lineal ft.; San Antonio Ave.—Paving 14.5c. per sq. ft. J. Hine and D. C. Sheehan: East Holt Ave.—Paving 14.5c. per sq. ft.; San Antonio Ave.—Paving 13.5c. per sq. ft.; South Garey Ave.—Paving 13.5c. per sq. ft.; Lordsburg Rd.—Paving 13.5c. per sq. ft.; culverts, \$300; West Second St.—Paving 13.5c. per sq. ft.; culverts, \$1,044. Fleming Bros.: Paving—N Garey, \$1,375; S Garey, \$1,143; Lordsburg road, W. Second, etc., \$144; East Holt, \$169; San Antonio Ave., \$142; curbing, \$35; culverts, Lordsburg road, \$440; W. Second, etc., \$1,250. Hine and Sheldon: Paving—East Holt, \$145; paving—All other streets, \$135; culverts—Lordsburg road, \$309; West Second St., etc., \$1,044. Brashear-Burns Co.: Paving—East Holt, \$123; Lordsburg road, \$111; other streets, \$118; culverts—Lordsburg road, \$309; West Second, etc., \$2,827.50. The bids were taken under advisement for one week.

Sacramento, Cal.—The most extensive road plans ever undertaken in Sacramento County, calling for construction of 271.55 miles of permanent roads and sixty-four bridges at total cost of \$2,425,000, have been submitted to Board of Supervisors by Secretary H. C. Maginn, of Sacramento County Highway Commission. Bond election to raise money to build these roads is urged in report.

Sacramento, Cal.—Sealed bids for construction work of 69.9 miles of State highway in northern and southern counties will be received by State Highway Commission in this city August 10th. In all ten units are to be opened for bids, as follows: Mendocino County, from 2½ miles north of Hopland to Ukiah, 11.4 miles in length; Humboldt County, from Miranda to Dyerville, about 13.8 miles; Santa Clara County, from Santa Clara to San Jose, about 1.9 miles; Santa Clara County, from the northerly boundary to San Jose, about 6.8 miles; Contra Costa County, from San Pablo Creek to Pinole, about 3.6 miles; Humboldt County, from Shively to Jordan Creek, about 3.7 miles; Alameda County, from Greenville to Livermore, about 5 miles; Santa Barbara County, from El Capitan Creek to Alcatraz, about 9.3 miles; Orange County, from Balivan to Irvine, about 9.4 miles. Imperial County, from Myers Creek to Coyote Wells, about 6 miles.

Stockton, Cal.—Plans and specifications have been adopted by city council for street improvements in Oaks. Work will be done in two sections designated by engineer as east half and west half. Improvements, which have been needed for so long by Oaks, will include asphalt-macadam pavement on Union, Pilgrim, Pinchot, Roosevelt, Acacia, Sierra Nevada and East streets, together with modern sidewalks and concrete gutters. Engineer Compton estimates that work will cost \$79,963.41.

Washington, D. C.—Total cost of resurfacing work contemplated is estimated at approximately \$360,000.

Arcadia, Fla.—Notice is hereby given that Board of County Commissioners of County of DeSoto, Florida, will receive sealed bids at office of Clerk of Circuit

Court, Arcadia, Florida, until 2 o'clock p. m. on the 8th day of September, A. D. 1914, for purchase of bonds of special road and bridge district No. 5, authorized and issued by said Board of County Commissioners for said special road and bridge district No. 5 in sum of three hundred and fifty thousand dollars. A. L. Durrance is Clerk of Circuit Court.

Fort Meade, Fla.—Election will be held August 21 for voting on \$25,000 bond issue for street paving.

Marianna, Fla.—County Commissioners of Jackson County have accepted proposition made by citizens of Marianna to provide for funds for paving with concrete around courthouse square.

Maxville, Fla.—City Council has recently decided to purchase steam roller and crusher for use on city streets. Contract was awarded to Buffalo Steam Roller Co., Buffalo, N. Y.

Anderson, Ind.—Gravel road bonds for \$9,500 have been sold at premium of \$45 to Miller & Co., of Indianapolis. J. F. Wild & Co. and Breed, Elliott & Harrison, of Indianapolis, were also bidders.

Hartford City, Ind.—City Council is contemplating oiling of Jefferson street in front of reservoirs at water works station to prevent dust from settling in water.

Laporte, Ind.—Board of Public Works has confirmed a resolution previously adopted calling for paving of Lincolnway in one square, between Jackson and Detroit streets. Authority was given to advertise for bids on four kinds of material, brick, concrete, asphalt concrete and bitulithic.

Iowa City, Ia.—Bids will be opened at City Hall on Aug. 7 at 2 p. m., for improving following streets with brick, bitulithic or such other material as may be selected by council: Snook's Grove Road, 4 blocks; Dodge St., 1 block; Van Buren St., 7 blocks; Governor St., 2 blocks; Burlington St., 3 blocks, and Washington St., 5 blocks. Total amount of paving, about 22 blocks, or 2½ miles. Specifications are now out and can be obtained from J. C. Watkins, City Engineer, or G. T. Reddick, City Clerk.

Baltimore, Md.—After long session State Roads Commission has decided to build proposed road from La Plata to Indian Head via Ripley. This is shortest route and least expensive to build. Delegations were present advocating each of three different routes. Commission also let several contracts, among them one for five-mile section of road between South River and Birdsville, in Anne Arundel Co. When this is completed there will be unbroken stretch of 95 miles of road between Baltimore city and Solomon's Island, at lower end of Calvert Co.

Cumberland, Md.—Ordinances for paving of thirty-two streets in every ward in city have been introduced and passed at session of City Council.

Cumberland, Md.—At joint meeting of City Council and Citizens' Advisory Committee in council chamber of City Hall, provision was made for expenditure of \$258,000 in paving dirt streets in Cumberland. Thirty streets were selected, for which bids will be asked at once and work begun on all of them.

New Bedford, Mass.—Construction of sewers on North Main St., Spring St., Bridge St., on contemplated Almy St., on contemplated Delano St., and whether town will extend Shone system east on Centre St. to contemplated Hitch St. will be considered.

Petoskey, Mich.—At meeting of City Council it was voted to bond city for amount of \$12,100 to pay for paving now going on in city.

Duluth, Minn.—Bids for concreting section of New Duluth road which will be improved this season will probably be advertised for at once, according to Commissioner Roderick Murchison, head of works division. He said that the engineering department has practically completed specifications. Part planned to be paved this year includes Zimmerly avenue from Ninety-third avenue west to Commonwealth avenue and Commonwealth avenue from Zimmerly avenue to the main line of the Spirit Lake Transfer Company, a distance of about two miles. Estimated cost is \$42,240. Bids will probably be opened about Aug. 1, after which contract will be let immediately unless figures are too high.

Ely, Minn.—Commissioners of Lake County have decided to lay out and establish road which has been known as St. Croix Lumber Company road and runs out of Ely. It connects with St. Louis county road at west side of section 31,

township 62, range 11, and runs east and southeast through Lake County, connecting with Isabelle road in township 59, range 8, in Lake County. When completed this will give direct route from Two Harbors, via Beaver Bay, to Ely and Tower.

Chillicothe, Mo.—Order has been made by City Council instructing city engineer to prepare plans and specifications and proper resolution to be presented at next meeting of City Council, for paving of Cherry St. from south line of Bryan St. to north line of Second St. with Tarvia.

Linden, N. J.—Two ordinances providing for construction of concrete curbs and gutters in portions of Wood Ave. and Gibbons St. have been passed on third and final reading by Township Committee.

Millville, N. J.—A motion to advertise the sale of \$36,000 worth of 4½% street paving bonds at once has been passed.

Millville, N. J.—City has advertised for sale of \$36,000 of bonds for street improvements.

Morristown, N. J.—Committee recently appointed to consider proposed bond issue for repair of Morris County roads, to amount of \$200,000 is now of belief that \$1,000,000 will be needed. It is figured that cost of improvement would be \$5,000 per mile, and there are about 100 miles which need attention. Construction of certain connecting links for these roads would make sum come to more than double that amount.

Morristown, N. J.—That cost of building more improved roads and repairing existing ones would be between \$1,000,000 and \$1,500,000 was conclusion reached by committee appointed by Director Simon E. Estler of Board of Freeholders to consider proposed bonding of county for \$200,000 for road project. There are now 183 miles of improved road in county and committee agreed that 100 miles could be rebuilt at cost of \$5,000 a mile, requiring \$500,000. To build connecting link desired, it was declared, would bring cost of road repair and improvement up to and beyond million dollar mark.

Roselle Park, N. J.—After much discussion of Borough Council it was voted to instruct engineer to advertise for bids for improvement of Walnut St., Sheridan Ave. and Locust St.

Brooklyn, N. Y.—Indications are that Board of Estimate, on July 30, will pass final authorizations of public improvements aggregating \$185,900, but unless present plans are changed, preliminary authorization of improvements will be laid over until a later meeting of the board. Final authorizations, scheduled to pass at July 30 meeting, include sewers, regulating, grading, paving and the laying out of new streets. According to present indications, they will be divided as follows: Brooklyn, 23; Queens, 7; Bronx, 1. Total, 31. With final authorizations disposed of board will be in position to pass some of preliminary authorizations, which were held up at the last meeting. They aggregate \$174,600 and are divided as follows: Brooklyn, 8; Bronx, 1; Queens, 8. Total, 17.

Schenectady, N. Y.—Bids will be received until 2.30 o'clock August 5, for about 64,000 sq. yds. of sheet asphalt paving and incidental work on Foster, Oakwood, Third and Tenth Aves., Edward St., Maplewood Ave., Ontario St., Watt St., Harrison Ave., Irving St., Hugh St., Ave. B, Leighton Ave., Rosa Rd., Turner Ave. and Ardsley Rd.

Scotia, N. Y.—Village improvement bonds amounting to \$2,500, have been sold.

Utica, N. Y.—City Engr. Kemper has filed with members of Board of Contract and Supply plans and specifications for paving Highland Ave., from Brayton Park Pl. to the city line, and Bank Pl. from Genesee to Union St.

Greensboro, N. C.—Citizens have decided that city should issue \$100,000 in bonds for permanent improvement of streets.

Cincinnati, O.—Mayor Spiegel has signed \$60,000 emergency bond ordinance for straightening of Reading Rd.

Cincinnati, O.—Road improvement bonds in sum of \$22,250, proceeds of which are to be used for paving of Cincinnati pike for distance of 2.25 miles, beginning at entrance of Calvary Cemetery, have been sold by County Commissioners to Seasongood & Mayer of Cincinnati, at their bid of premium or \$532.50.

Columbus, O.—State Highway Commissioner Marker has sent to contractors invitations to bid on road contracts aggregating \$2,500,000, largest letting in

single day ever offered by state, to be made Aug. 4. Entire mileage amounts to 193 miles and most roads are to be built of brick. Largest single contract to be let is national road in Guernsey County, 14 miles, to cost \$337,489.

Coshocton, O.—New Concord will have concrete paving on Main St. instead of brick, at cost of \$32,000.

Lima, O.—Allen County finally will co-operate with state in building of all of main market roads and other inter-county highways within county, as designated by state highway department. One of new roads to be improved will be Findlay Pike, running northeast from city, and other road running from Spencerville west to Van Wert County line. The Findlay road will be of macadam from city limits to Waldorf school house at forks of Findlay and Lafayette roads, distance of $1\frac{1}{4}$ miles. Macadamized part of road will be 18 to 20 ft. wide. The highway from Spencerville to Van Wert County line will be 24 to 26 ft. wide in all, of which 16 ft. will be of macadam.

Marion, O.—Resolutions for Marion-Kenton and Marion-Galion pikes have been prepared and presented for adoption by County Commissioners. The Marion-Kenton is to be four miles long, and will cost \$39,400, with bridges and fills. The Marion-Galion pike is to be about two miles long, and cost \$21,800, with bridges and fills. Flooring of bridges is to be built of creosote block.

Salem, O.—An estimate on cost of constructing a reinforced concrete paving for McKinley Ave. will be made by C. H. Ferguson of Cleveland.

Hood River, Ore.—Highway bonds in sum of \$75,000 have been voted.

Portland, Ore.—Portland street and sewer improvement bonds amounting to \$166,571 have been sold to Lumbermens Trust Company for premium of 4.51 per cent.

Altoona, Pa.—Ordinances are being considered for paving of about nine streets.

Chester, Pa.—Loan of \$75,000 has been authorized, of which \$45,000 is for paving and curbing.

Montgomery, Pa.—Special election held at Montgomery to determine whether or not bond issue for paving purpose should be issued resulted in almost unanimous vote in favor of issue. This means that Montgomery will expend \$20,000 in paying borough's share for paving main thoroughfare of place, from one end of borough to other. Length of pavement will be one and one-eighth miles.

New Castle, Pa.—Bids for the grading and paving of Shenango St. in First Ward, will be advertised for by City Clerk. Work will be done under direction of city, but will be paid for by P. & L. E. Railroad Co.

Philadelphia, Pa.—Bids for continuing widening of Delaware Ave. southward from Christian St. have been received. Present contract will be limited to \$120,000, and provides for widening the avenue, taking portion of some buildings. There were 43 items upon which bids were received, and about six bids on each item. It will be some days before low bidders are ascertained.

Williamsport, Pa.—Purchase of street flushers is being considered.

Sharon, Pa.—Bids will be asked within next few days on job of paving that section of Brookfield township beginning on Davis street and extending over road to Warren as far as limits of township, distance of seven miles. Redrawn plans for road have been approved by Ohio state authorities.

Chattanooga, Tenn.—Paving bonds in sum of \$7,174.84, have been sold to Security Savings & Trust Company, of Cincinnati.

Cameron, Tex.—The Milam County Commissioners' Court has advertised for bids for construction of 50 miles of permanent public roads in Road District No. 2 of Milam County. This will be paid for out of bond issue of \$150,000 voted some weeks ago. Number of prominent contractors over county are inspecting plans and specifications with view of submitting figures.

Dallas, Tex.—Bids will be asked by Board of City Commissioners on paving of seventeen streets selected recently for improvement this year from proceeds of the 25c paving tax.

El Paso, Tex.—Concrete roads will be built by government on Fort Bliss reservation. Bids are now being asked for by Capt. Hunt and specifications include best quality of concrete roadway. Total cost will be \$15,000.

San Antonio, Tex.—A call for paving bids on 43 streets has been authorized. Bids are due August 24. On four of the streets mesquite blocks had been voted. New contracts are to be made because of inability of contractor to furnish mesquite in sizes required, as result of which the city is threatening a suit to forfeit his bond. Seventeen of streets, lying in the Second Ward, are short. Others, more scattered, are short or form connecting links between streets on which paving already is awarded. The 43 streets will cost near a quarter of a million dollars. Paving on 17 streets in Ward 2 was restricted to cost not more than \$1.40 a sq. yd. At prices in recent bidding this will include concrete and bituminous macadam. Streets awarded brick: Hackberry St., Commerce to Grayson, \$73,281.80; New Braunfels Ave., Van Ness to Grayson, \$14,520.24; Burnet St., Hackberry to Chestnut, \$15,722.86; Sixth St., Ave. C to Burnet, \$9,724.15; Lafitte St., Water to Santa Clara, \$14,089.16; Sycamore St., Commerce to North, \$9,676.35; Santa Clara St., Lafitte to Plum, \$2,230.15; Hackberry St., Denver to Commerce, \$50,128.60; Plum St., Santa Clara to Goliad, \$13,432.37; Wyoming St., Plum to Walnut, \$3,429.80; Labor St., Carolina to Goliad, \$26,853.60; Camargo St., Labor to South Presa, \$15,719.90; Water St., Lavaca to Commerce, \$20,617.25; Presa St., River to Alamo, \$16,718.70.

CONTRACT AWARDED.

Lonoke, Ark.—To T. H. Bunch Co., of Little Rock, Ark., at \$39,505, for construction of 11 miles of macadam road, by Lonoke County Commissioners. Work consists of grading, culverts, hauling, spreading, rolling, macadamizing, clearing and grubbing in Road District No. 7.

Pomona, Cal.—At regular meeting of City Council, contracts were awarded for street paving work on main avenues leading into Pomona. Successful contractors and amounts of their bids are as follows: Brashers-Burns Co., San Antonio Ave., 351,218 sq. ft., at \$1.18; Lordsburg Rd., 99,385 sq. ft., at \$1.11; culverts, \$309; North Gray Ave., 252,543 sq. ft., at \$1.18; culverts, \$2,827.50. G. H. Oswald Co., South Garey Ave., 339,327 sq. ft., at \$1.2 2-3; East Holt Ave., 1,708,198 sq. ft., at \$1.2 1-4; West Second St., 214,599 sq. ft., at \$1.2 2-3; culverts, \$1,560.50. Total amount of two bids is approximately \$168,000. Of this amount property owners pay one-half and city pays other half.

Sacramento, Cal.—For constructing State Highway in Yolo County, Division III, Route 6, Section B, bids were as follows: Sound Const. Co., San Francisco, Cal., \$245,309; Van Sant-Houghton Co., San Francisco, \$243,877.35; Graff Const. Co., Seattle, Wash., \$239,703.80, and Mahoney Bros., San Francisco, \$260,868.35.

San Francisco, Cal.—To I. W. McClenahan, at \$54,860, for grading, etc., of civic center.

Denver, Colo.—To H. L. Kuykendoll, of Platteville, Colo., grading and graveling of $2\frac{1}{2}$ miles of road, at \$585 for grading and \$1.62 $\frac{1}{2}$ per yd. for gravel.

Tampa, Fla.—To Edwards Construction Co., for paving with first class brick laid flat, Florida avenue, from city limits to Buffalo and Buffalo street, Florida to Nebraska streets, at following bid: No. 1 brick, granite curbing, \$34,455; wood curb, \$25,309.

Allison, Ill.—For construction of gravel roads, to P. W. Lenahan, Vincennes, Ind., at \$8,395, and to Isaac Daines, Vincennes, at \$3,090.

Pontiac, Ill.—Lowest bidder on the South Locust street brick pavement was Lobb and Sons, of Pontiac, their bid being \$17,150. Contract was awarded to them.

Sterling, Ill.—Contract for construction of North Sixth Ave. pavement of city of Sterling, extending in west half of roadway of Sixth Ave. from center line of East 13th St. westerly, to north limits of city of Sterling, has been let by Board of Local Improvements to O'Rourke & Ridgely for \$4,421.71. Contract for construction of east half of same street was let by Road Commissioner John Landis, for township of Sterling, to same firm, for same amount, making total cost of improvement \$8,843.42.

Virginia, Ill.—To Beardstown Concrete Co. contract for nearly a mile of hard road between this city and Beardstown, their bid being \$4,500.

Waukegan, Ill.—Contract for 8,610 sq. yds. asphaltic concrete, to Western Improvement Co., Racine, Wis., at \$18,018.80. Other bidders as follows: H. G. Goelitz, Oak Park, Ill., \$19,236.50; M. McCugo, Waukegan, Ill.; White Const. Co., Milwaukee, Wis., \$20,471.10; and John A. McGarry Co., Chicago, Ill., \$21,186.70. M. J. Donthitt.

Brownstown, Ind.—By Commissioners of Jackson County, contract to George Bebout, Freetown, Ind., for construction of county line road, and contract to Samuel B. Smallwood, Ewing, Ind., for construction of gravel road in Owen Township.

Fort Wayne, Ind.—To Roney Chevilot, contract for construction of six miles of stone macadam road at \$32,277.90.

Indianapolis, Ind.—For constructing concrete road running from Perry Township line to Shelbyville road in Center Township, to J. Harry Roberts, at \$3,549.

Roanoke, Ind.—By Counsel for paving six squares, to C. C. Huffine & Co., \$10,000.

Shelbyville, Ind.—To Roger Larch of Hope, contract for repair work on Armstrong County line road by Commissioners of Shelby and Decatur counties. Larch's bid was \$4,690.

Coffeyville, Kan.—Frank Good of this city has been awarded contract by County Commissioners, being job thrown up by Stuckey & Murphy, for construction of 37 cement culverts on county road west from Coffeyville through Dearing, Tyro and Caney to Chautauqua line. Total consideration is \$2,779.08.

Dodge City, Kan.—A. R. Young and Company, contractors, have secured a \$50,000 paving contract at Dodge City. Contract calls for paving with brick of business section of city. Seven other contractors were bidding on the job.

Newport, Ky.—For furnishing steam roller by Campbell County Fiscal Court to Ohio Tractor Co., Marion, O., at \$2,575.

Baltimore, Md.—To M. J. Beach, at \$3.30 per sq. yd., for paving with granite blocks third section of Fallsaway, between Madison and Chase streets.

Salem, Mass.—By County Commissioners at Salem, contract of replanking sidewalk of Haverhill lower bridge, to Thomas R. Cook, of Haverhill, for \$1,042, and \$55 per 1,000 ft. for lumber found to be needed for repairs on under structure of bridge.

Iron Mountain, Mich.—For paving Ludington St. with bituminous macadam to Hicks & Barber, Vulcan, Mich., at \$60,000.

Duluth, Minn.—Contract for laying concrete pavement with granite curb on South First Ave. east from railroad tracks to Buchanan St. and on Sutphin St. between South First Ave. east and Lake Ave., has been awarded to D. H. Clough & Co. Their bid was \$35,018.08. Contract for improving Victoria St., between Woodland Ave. and the Hartley Rd. will be awarded to A. N. Nelson. A 16-ft. concrete pavement will be laid. Nelson's bid for one-course concrete was \$9,336.65 and for two-course, \$9,509.65. Whether one-course or two-course will be laid has not been determined.

Ely, Minn.—County Commissioners have awarded contract for the grading of Stanley-Knife River road to Fred Hagberg. Proposed road will be four miles long and will run along boundary of Lake and St. Louis counties and connect with county road near Knife river. Town of Two Harbors is to stand one-half of cost of building this road.

Hibbing, Minn.—To J. C. Brown, at \$11,860, for building $2\frac{1}{2}$ miles of Falmi road, by Stuntz Township Board.

Virginia, Minn.—To Lawrence McCann, of Eveleth, Minn., at \$51,757, for paving of 13 blocks with creosoted blocks.

Newark, N. J.—By Board of Freeholders, for improvement of Pompton Turnpike, from Bloomfield Ave. to Passaic County line, with warrenite pavement, and 8-ft. strips of bitulithic on each side on all grades, to Standard Bitulithic Co., \$93,806. Other bids as follows: Union Building & Construction Co., \$95,009; Newark Paving Co., \$95,238; Francisco Bros., \$96,932; Osborne-Maisellis Co., \$98,130.

Akron, O.—By Board of County Commissioners, for improving Loyal Oak Road, to Portage Engineering Co., Akron; also contract for improving Arlington Road, to McLonan Bros., Akron.

Cincinnati, O.—By Board of County Commissioners, for repairing Harrison and New Haven Pike, Crosby Township, to E. Fagaly, Harrison, O., at \$4,215.

Easton, O.—For paving Main and Cherry Sts., to Andrews Asphalt Co., at about \$50,000.

Hicksville, O.—To Clemmer & Johnson, Defiance, O., for brick paving, and to Johnson Construction Co., Chicago, for asphaltic concrete block pavement on five streets of village. Cost of work is estimated at \$55,000.

Versailles, O.—For paving with brick 14,100 sq. yds. on Main St. to John Hennessey & Bro., Troy, at \$34,659.

Chester, Pa.—Marcus Hook, Borough Council, has passed necessary legislation to award contract for paving of Market street from Delaware avenue to Pennsylvania railroad. The Standard Bithulithic Company was successful company.

Cooperstown, Pa.—By state highway department, for brick pavement from Jackson township line to borough line of Cooperstown to Northwestern Construction Co. of Franklin, at \$12,991.70.

Norristown, Pa.—For constructing 2-mile telford road from Krewsons corner, Church road to Jenkintown to Ambler-Davis Constr. Co., at \$30,900.

Seranton, Pa.—For constructing macadam roadway to Herrick Constr. Co., Bennett Bldg., Wilkesbarre. C. P. Savage is Co. Compt.

Williamsport, Pa.—B. H. Coryell has been awarded contract by state highway department to construct pavement in Elk County. Bid of local contractor was \$27,821.25.

Austin, Tex.—Part of work for improving East First street, will be done by contract, though most of it will be done by city labor. Mayor has signed contract with Monroe Walker, whereby Walker will remove present surface of street for four blocks from Chicon to Canadian street at 30 cents per cubic yard, and will haul gravel for same four blocks at 80 cents per cubic yard.

Cameron, Tex.—Commissioners' Court have awarded contract for construction of roads in Precinct No. 1. A. Waco firm of contractors secured contract amounting to \$72,000.

Salt Lake City, Utah.—Acting upon advice of City Attorney H. J. Dinny, Commission has awarded contract for paving Eighth West street to G. A. Herman on bid of \$121,998.03.

Stamford, Ont., Can.—To Peter Lorenzo, contract on about mile of concrete sidewalk in Stamford town, and in Stanley St.

SEWERAGE

Phoenix, Ariz.—Vernon Vaughan, County Recorder, has received word from Congressman Hayden and Senator Henry F. Ashurst of practical passage of appropriation of \$32,500 desired for construction of modern sewer system to connect Indian school to city sewer.

Galt, Cal.—Installation of modern sewer system to cost \$17,000 is being discussed.

Riverside, Cal.—City is planning to construct sewer in Arlington District, to cost about \$30,000.

Bridgeport, Conn.—Because City Engineer Alfred H. Terry advised Paving and Sewer Commission that all bids before them for sewer construction in three separate points were too high, Board has laid two upon table and absolutely rejected the third.

Bridgeport, Conn.—Commissioner M. H. Rogers has moved that bids on Walnut street sewer be rejected and new bids advertised for. This motion was carried without opposition.

Bartow, Fla.—Extension of sanitary sewerage system from Oak Ave. East on North St. to Searcy Ave. is being planned.

Fort Meade, Fla.—See "Water Supply."

Atlanta, Ga.—It is proposed to issue bonds up to \$100,000, \$25,000 of which will be issued next fall. With this amount it is proposed to build a water-works plant and lay additional sewers.

Indianapolis, Ind.—Question of sewage filtration is being discussed.

Mishawaka, Ind.—Resolution has been adopted calling for construction of lateral sewer on Columbia street. Petitions were received for lateral sewers on West Lawrence street from Elizabeth to Ann streets; on West Broadway for one block; and on West Battell from Ann to Charlotte streets. They were referred to City Engineer Charles Cole.

Burlington, Ia.—Third reading of ordinance issuing \$92,000 worth of bonds for Hawkeye overflow sewer has been held and ordinance passed.

Dubuque, Ia.—City will construct sanitary sewer in Cleveland Ave. J. J. Shea is City Recorder.

Dubuque, Ia.—City Council will construct 8-in. tile pipe sanitary sewer in Cleveland Ave. J. J. Shea is City Recorder.

Kensington, Md.—See "Water Supply."

New Bedford, Mass.—Construction of two new sewers have been authorized.

Butte, Mont.—Election will be held on July 30 for voting on \$200,000 bond issue for construction of system of storm sewers. P. J. Green is City Clerk.

Deerwood, Minn.—Following are bids received for construction of sewers: Magnus Johnson, Minneapolis, \$9,100; Ilstrup & Olson, Minneapolis, \$8,720; Lawrence McCan Co., Eveleth, Minn., \$8,462; Tanner Bros., St. Paul, Minn., \$8,750; Pastocet Const. Co., Duluth, Minn., \$7,580; Greene Contracting Co., Albert Lea, Minn., \$8,850, and F. A. Glass, Brainerd, Minn., \$12,935.

Duluth, Minn.—Three sanitary sewers have been ordered. Largest will be laid in 52d Alley west from Ramsey St. to Polk St. Estimated cost is \$3,415.50. Another will be constructed in Wellington St. at Michigan Ave. at estimated cost of \$856.19, and the other in East 10th St., between 12th and 13th Aves., at estimated cost of \$464.37.

Dunkirk, N. J.—Petition has been received from property owners asking for construction of sewer in Maple Ave. from Doughty to Benton St., following which resolution was adopted instructing engineer to prepare plans for same.

Elizabeth, N. J.—At joint meeting of river improvement and finance committees of City Council, plan for correction of defects of intercepting sewer was agreed upon and recommendations of Consulting Engineer William H. Harding endorsed. Two committees will place matter before City Council and advise appropriation of \$25,000 for purpose of making necessary changes.

Elizabeth, N. J.—Favorable action has been taken by City Council upon recommendation that \$25,000 be appropriated to make the intercepting sewer do work for which it was constructed, and Consulting Engineer William H. Harding, of New York, was engaged to supervise work.

Amsterdam, N. Y.—Commissioner of Public Works John B. Wright has completed plans and specifications for storm sewer proposed to be constructed from Northampton Road to new culvert on West Main Street, between Bayard and Clinton streets.

Binghamton, N. Y.—City Engineer John A. Giles is preparing plans and specifications for another portion of intercepting sewer system on Conklin Ave. and Alderman Charles H. Bone will introduce ordinance into Common Council asking that body to declare its intention to construct same. Portion of entire system will be 2,000 ft. in length, starting at Rockbottom dam, about opposite foot of Carroll St. and continuing west to Washington St. Bridge. City Engineer Giles estimates that this will cost approximately \$18,000.

Great Neck, L. I., N. Y.—Prominent civic workers here have plans under consideration for establishment of sewer district. The Great Neck Taxpayers' League has also taken up matter and it is hoped to have work under way before the fall. Estimated cost, \$200,000.

Newburgh, N. Y.—Extension of sewer in Robinson Ave. is being considered. D. J. Coutant is City Clerk.

Watertown, N. Y.—First steps toward construction of trunk sewer for relief of Arlington and Academy street sewers have been taken by Board of Public Works, when a resolution was adopted authorizing receipt of bids. Sewer will be built under \$15,000 bond issue, which was part of \$65,000 issue voted for various improvements last spring.

Bellevue, O.—City engineer has been instructed to draw up plans for sewer to be constructed in Taylor Ave., between Retreat and Grandview Aves.

Enterprise, Ore.—City has voted bonds in sum of \$20,000 for purpose of extending sewer system. Work includes construction of septic tank, outlet and main trunk sewer.

Chester, Pa.—Loan of \$75,000 has been authorized, of which \$4,000 is for sewers.

Williamsport, Pa.—Ordinance has been passed providing for storm water sewer in Maynard alley between Locust and Campbell street, to cost about \$14,000.

Providence, R. I.—A 50,000,000-gallon capacity centrifugal pump, together with big horizontal condensing engine and rope-drive, will be purchased by city shortly for installation at Ernest St. sewage pumping station to take care

of constantly increasing amount of sewage to be pumped from centre of city to precipitation tanks at Field's Point. Entire outfit installed will cost approximately \$20,000.

Warren, R. I.—Town has decided to install sewer system, at estimated cost of \$46,000. Charles Y. Chase, 75 Westminster St., Providence, is Engineer-in-Charge.

Dallas, Tex.—Announcement has been made that bids would be called for this month on construction of two large sanitary sewer mains which will be part of proposed sewerage disposal system. These mains are Oak Cliff and Oak Lawn interceptors, which will terminate at sewerage pumping plant at foot of Cadiz street. Specifications for large mains have been requested of James H. Fieries, expert, who designed filtration and sewerage disposal plants. Water and Sewerage Commissioner R. R. Nelms expects to receive plans within short time.

Antigo, Wis.—Reconstruction of large portion of sewage disposal plant is being considered.

Racine, Wis.—At regular meeting of street committee of Common Council it was decided to report in favor of adopting specifications and estimates for trunk sewers on north and west sides, as prepared by city engineering department. It was also decided to defer action on trunk sewer in 21st St. district until next Council meeting. Specifications and estimates as submitted by engineering department were gone over carefully. These show that although total cost of constructing sewers is close to \$300,000, share to be paid by city is only \$203,433. Remainder will be assessed against residents who are benefited. The territory covered by three trunk sewers, and estimated cost to city is as follows: North Side sewer, Augusta St., from the lake to Northwestern tracks; Geneva St., Gould St. to Melvin Ave.; Wolf St., Geneva St. to Northwestern tracks; Layard Ave., Geneva St. to west limits; Douglas Ave., Gould St. to Melvin Ave.; city's share, \$67,950. West Racine sewer, main trunk sewer from Cedar Bend to Lathrop Ave. on 12th St., city's share, \$55,117. South Side sewer, on 21st St., from lake to West boulevard, city's share, \$80,365.

CONTRACTS AWARDED.

Hartford, Conn.—To C. H. Slocumb & Co., of Hartford, for construction of overflow sewer in Granby street, and Westbourne parkway to Park river, on one of the following bids: Concrete pipe, \$18,843; vitrified tile, \$18,555.

Chicago, Ill.—After years of insistent demand on part of citizens of East Side for sanitary sewer system, contract for that work has been let, and construction will begin in very short time. Board of Local Improvements have opened bids for improvement, awarding contract to Robert Nelson, lowest bidder, for \$74,568.20. Other bids submitted to Board were as follows: Carson, Payson & Co., Danville, Ill., \$92,153.17; William E. Dee & Co., Chicago, \$80,240.24. Green & Son, Streator, \$75,517.81.

Pontiac, Ill.—Green and Sons, of Ottawa, were lowest bidders for construction of Riverview, Riverside and Driving Park sewer system, their bid being \$29,808.65, and contract was awarded to them.

Mason City, Ia.—For constructing 7,221 ft. 30, 20 and 15-in. vitr. sewer pipe to S. R. Brown, Mason City.

Boston, Mass.—For constructing sewers in Lake St. to Wm. L. Dolan at \$6,840.

Fitchburg, Mass.—By Sewage Disposal Commission to Michael Gammino, Providence, R. I., for lateral connections with main sewer, and also about 800 ft. 72-in. concrete sewer, at \$37,880. Next two lowest bids: McCarthy & Walsh, East Boston, Mass., \$38,453; Wm. J. Donovan, Fitchburg, \$40,611. Davis A. Hartwell is Ch. Engr.

Swampscott, Mass.—By Water Commissioners, contract for construction of 2,270 ft. of pipe sewer in Humphrey St., from present pumping station easterly, to Michael McDonough Co., of Swampscott, for \$13,396. Other bidders were: Abram French, \$16,743.80; F. D. Mayo Co., of Lynn, \$13,977.99; D. J. Sheehan Co., of Lynn, \$15,745; J. T. Lyons, \$15,374.75.

St. Paul, Minn.—The Park avenue and Maryland street sewer contract has been awarded to O'Neill & Preston by Council at \$5,240.

Newark, N. J.—Contract for construction of part of section 12 of Passaic Valley trunk sewer has been awarded by Sewerage Commission to J. F. Shanley

Co. Of six bids received, that of \$129,589.36, made by Shanley company, was the lowest. Part awarded comprises the Third River crossing. Bids will be received by the commission shortly for part of section 27, comprising Passaic River crossing, and for section 14, located in Passaic.

Plainfield, N. J.—To Kelley-McFeeley Co., Camden, N. J., at \$32,003, for construction of sanitary sewers.

Buffalo, N. Y.—For constructing a 9-ft. 6-in public trunk sewer in Hertle avenue, to Jos. F. Stabell Co., at \$93,983.

Oneida, N. Y.—Board of Public Works has opened bids for construction of two pieces of sanitary sewer on Sherman St., east and west of William St. Four bids were received on each section of sewers. On section between Williams and James Sts., Nixdorf & DeSinz's bid was \$844.24; Carnival Bros., \$1,065.10; A. H. Fitch, of Utica, \$1,050.80; H. W. Barnard of Rome, \$1,069.68. On the section between Williams and Lake Sts., Nixdorf & DeSinz's bid was \$323.10; Carnival Bros., \$345; A. W. Fitch of Utica, \$389; H. W. Barnard of Rome, \$304.20. Contract on west section was awarded to Nixdorf & DeSinz of Oneida. On east section to H. W. Barnard of Rome.

Oneida, N. Y.—Bids have been presented for construction of two pieces of sanitary sewer on Sherman St., east and west of William St. Four bids were received on each section of sewers. On section between Williams and James Sts., Nixdorf & DeSinz's bid was \$844.24; Carnival Bros., \$1,065.10; A. H. Fitch, of Utica, \$1,050.80; Frank George, 133 E. Dominick St., Rome, \$1,069.68. On the section between Williams and Lake Sts., Nixdorf & DeSinz's bid was \$323.10; Carnival Bros., \$345; A. W. Fitch, of Utica, \$389; Frank George, of Rome, \$304.20. The contract on the west section was awarded to Nixdorf & DeSinz, of Oneida. On east section, to Frank George, of Rome.

Buffalo, N. Y.—For constructing 9½-ft. brick trunk sewer in Hertel Ave., by Board of Public Works, to Joseph F. Stabell, at \$93,983.

Glen Cove, L. I., N. Y.—By Glen Cove Sewer Commission, to Joseph B. Sigretto & Co., New York, N. Y., contract for completing construction of sewer system and disposal works. Johnson & Fuller, 150 Nassau St., are Consulting Engrs.

Rochester, N. Y.—Lewis H. Brotsch is low bidder on construction of Atlantic Ave., Winton Road and Merchants Road sewer, but it is possible that because check accompanying bid was not sufficient amount, Board of Contract will not award contract to him. His bid was \$65,280. John Petrossi submitted next lowest bid, which was \$69,361. The Schroeder-Hicks Co. bid \$70,818. The Brotsch bid is \$4,150.45 less than Petrossi bid.

Erie, Pa.—For sewers as follows: In Raspberry, Cascade and 4 other streets, to Willis Bancroft, Jr., at \$15,883; in 19th and Cranberry Sts., Jos. McCormick & Bro., \$15,232.

Hazleton, Pa.—For construction of Ridge street and Clay avenue sewers and flume, the Council decided not to divide contract, but to award contract to lowest bidder on combined work. Totals of the bids were as follows: Schneider Bros., \$12,660.25; Jacob Jacoby, \$14,799.80; James Correlli, \$13,485; Mike Yacina, \$12,701.65; Ario Ruth, \$11,642.25; Ludwig Kramer, \$12,288.35; William Kramer, \$12,680.75. Contract was awarded to Ario Ruth.

Sandusky, O.—To Glaser & Hettrick Co., of Oakharbor, O., at \$25,006, for construction of west end sewer system, except small section of 24-in. pipe, which is to be of vitrified brick. Sewer will be of concrete.

Youngstown, O.—Contract to supply 1½ miles of Natco lock-joint sewer tile in diameters ranging from 30 ins. to 40 ins. for use in municipal work has been awarded to National Fire Proofing Co. of Pittsburgh, Pa. Mr. Chas. Harris is the contractor.

Erie, Pa.—By City Council, to Willis Bancroft, Jr., and Joseph McCormick & Bro., for constructing storm sewers in South Erie. Estimated cost is \$46,445.

Meadville, Pa.—For construction of sanitary sewer in East Henry St. to Keystone Construction Co.

Fayetteville, Tenn.—To Georgia Engineering & Construction Co., Clayton, Ga., at \$48,366, for construction of sanitary sewer system.

Dallas, Tex.—Lowest bid on construction of a 12, 15 and 18-in. sanitary sewer

from point east of Fair Grounds to Ross Ave., opened by Board of City Commissioners, was filed by C. W. Olcott. The tabulation of bids showed the following results: C. W. Olcott, \$17,213.20; Dallas Lime & Gravel Co., \$17,507.25; F. H. Long, \$19,522.16; Winslett-Eldridge Co., \$22,567.25; Ennison & McCord, \$25,453.95. City Water and Sewerage Commissioner R. R. Nelms, to whom bids were referred by board, will submit his recommendation of award to lowest bidder.

Racine, Wis.—To Patrick Gavahan, at \$0.80 per lin. ft., and \$40 each for man-holes, for construction of 8-in. pipe sewers in Kinzie, Hayes and Arthur avenues.

West Allis, Wis.—For constructing addition to sewage disposal plant to Esau Kroening Construction Co. at \$12,595. Three next lowest bidders: Coddington Eng. Co., \$13,399; O. H. Bossert Co., \$14,033; and C. J. Moritz, West Allis, \$14,236. E. G. Orbert is City Engr.

Whitby, Ont.—For sewerage system, contracts were awarded as follows: System to R. B. Stewart, of Whitby, at \$54,650; disposal work, F. F. Fry, Toronto, \$24,943; furnishing pipe, Ontario Sewer Pipe Co., at \$13,000, and reinforced concrete pipe for trunk sewers to Blair C. Woodstock, at \$12,570.

WATER SUPPLY

Birmingham, Ala.—Resolution has been passed by Commission instructing city engineer to draw up plans as soon as possible for municipal water plant.

Eufaula, Ala.—In order to meet growing demand for artesian water, city is considering having another well bored on bluff.

Boulder, Col.—City Council is planning to construct dam at Silver Lake, at estimated cost of \$50,000, for city water supply.

Fort Meade, Fla.—Election will be held August 21 for voting on \$7,500 bond issue for extension of water works and sewerage system.

Atlanta, Ga.—See "Sewerage."

Morrison, Ill.—Bonds in sum of \$8,000 for making improvements and extension to water system have been voted at election.

Sterling, Ill.—H. F. Ferguson, of Urbana, an engineer engaged in state water survey, has commenced investigation at Pecatonica of waters of Rock River and all of its tributaries, to determine if waters of streams are being polluted by raw sewage dumped into them.

Indianapolis, Ind.—Public Service Commission has approved agreements by Indianapolis Water Co., the Beech Grove Improvement Co. and Big Four Railroad, relative to extension of water company's mains to Beech Grove.

Lawrenceburg, Ind.—Greendale Council has granted franchise to A. D. Cook to construct water works at cost of \$25,000. Mains will be laid on all principal streets. Plant is to be completed within one year.

Dubuque, Ia.—Bids for construction of large water reservoir on Kelly's bluff, south of West Third St., will be opened by city water works department on July 29th. Many contractors from here and other cities are entering bids. Reservoir will about double city's water pressure.

Monticello, Ia.—At special meeting of Council an ordinance was passed authorizing establishment of water meters.

Armer, Kan.—Election for water and light plant has been carried.

Mulberry, Kan.—Town manager Marion has said that city is preparing to spend about \$5,000 for water mains and laterals to extend present system. Part of material will consist of 2,000 ft. of 4-in. gas pipe and 5,900 ft. of galvanized pipe, all to be used as mains and laterals.

Shreveport, La.—City Council has ordered election by property owners Aug. 20 on proposition of issuing \$1,200,000 in bonds for purchasing or constructing water and sewer system.

Kensington, Md.—Mayor and Town Council will hold special meeting evening of July 31, to open proposals for furnishing materials and performing all work in connection with construction of public water supply and sewer system for Kensington. Recent legislature enacted law authorizing bond issue not to exceed \$50,000 for the purpose.

Mount Savage, Md.—Citizens of north side have subscribed toward new water system to be installed at once. Reservoir will be built on farm of Charles O'Toole, about 300 yards west of his residence, on elevation of 250 feet above main artery of Mount Savage. Supply has always been non-failing.

Seconticut Neck, Mass.—Property owners of Seconticut Neck to number of 125 or so are signing petition to town authorities of Fairhaven that water from Fairhaven supply may be piped to the Neck.

Petroskey, Mich.—It has been voted to extend water mains to Arlington Heights.

Duluth, Minn.—City Council has heard the first reading of ordinance making additional appropriation of \$5,000 to pay remainder of cost of new middle system reservoir at First Ave. east and 13th St. Total cost of reservoir was about \$45,000.

Butler, Mo.—Harper & Stiles, Grand Ave., Temple, Kansas City, Mo., have prepared plans for extensions to water works. City recently purchased private water company for \$32,500 and will spend \$40,000 on extensions.

Albion, N. Y.—Village will purchase plant of Albion Waterworks Co. at price not to exceed \$100,000, and about \$65,000 will be used for improving system.

Barker, N. Y.—Installation of water system is being discussed.

Hudson, N. Y.—At total cost of two and a half million dollars the 15,000 acre bottom of Ashokan reservoir is to be coated with patented preparation to prevent loss and contamination of water.

Lestershire, N. Y.—Board of Trustees of the Village of Lestershire, Broome County, N. Y., will received sealed proposals at the Council Chamber in Municipal Building, until 8 o'clock p. m., on the 30th day of July, 1914, for sale of bonds in amount of \$10,000 for the purpose of enlarging and improving the pumping system at its water works on Broad St. W. C. Lewis is Village Clerk.

Lestershire, N. Y.—Question of installing additional pumps is being considered by Water Commissioners.

Niagara Falls, N. Y.—Water bonds in sum of \$65,000 has been sold.

Port Chester, N. Y.—Daly & Merritt, the Port Chester and Greenwich contractors, have been awarded contract to lay about two miles of 24-in. pipe above Alexander Mead's place, on Lake Ave., and five miles of smaller pipe along Parsonage Rd. and to Cos Cob.

Schenectady, N. Y.—Ordinance has been passed directing laying of water mains in Avery St. from Strong St. to Wyllie St.; also ordinance directing extension of water main in Oakwood Ave. to Vine St., distance of about 100 ft.

Schenectady, N. Y.—Bids will be received until August 5 for furnishing all material and labor and construction of 20,000,000 gallon capacity reservoir on Bevis Hill, Niskayuna, near easterly border of city.

East Youngstown, O.—Installation of water supply from artesian wells in Coltsville is being considered.

Talihina, Okla.—Aug. 4 has been set as date for election to pass upon proposed bond issue of \$15,000 to enlarge city water works. Bonds are to mature in 20 years and draw 6 per cent. interest.

Tulsa, Okla.—City is considering constructing pipe line 50 miles long to Grand River for water supply. Estimated cost is \$1,000,000.

Nehalem, Ore.—Election for the issuance of \$12,500 in bonds for purchase of local water system, construction of reservoir, and for building of electric light plant by municipality, has been carried by vote of 63 in favor to only 8 against.

Portland, Ore.—The Colby Engineering Co. has submitted lowest bid to city for furnishing Water Bureau with 750 five-eighths inch water meters. Price quoted being \$5.95. Type of meter covered in this proposal is the Worthington, many of which are in service in this city. Crant Company offered lowest proposal for the 25 three-fourths-inch and the 25-inch meters, the former being listed at \$9.40 and the latter \$12.90 each. This company handles its own make of meters known as the Enarc. There were seven bidders, the one submitting the highest proposal being the Trident Meter Co., which asked \$8.40 for its five-eighths-inch meter. Bids will all be referred to Commissioner Daly by Purchasing Agent Wood and time set for various meter agents to make arguments favoring their proposals.

Winneshoro, S. C.—Citizens are discussing \$100,000 bond issue for waterworks system and repair of electric light plant.

Yankton, S. D.—Public notice is given that Board of Commissioners of city of Yankton, S. D., on the 5th day of August, 1914, at the city hall, at 9 o'clock a. m., will receive bids for, and award to the best bidder, \$60,000 water works bonds. J. W. Summers is City Auditor.

Livingston, Tex.—City Council has ordered election for Aug. 20, at which time citizens will vote to determine whether or not city will issue bonds to amount of \$25,000 for building waterworks system.

Cotulla, Tex.—At regular meeting of City Council, on petition of about 75 property tax payers, election was ordered to be held August 8 to determine whether or not Cotulla would issue \$14,000 bonds for purpose of drilling artesian well and putting in water works system.

Salt Lake City, Utah.—Final steps to close deal by which Salt Lake takes over water system of Forest Dale have been taken by city commission, when appropriation of \$15,000 was made from water bond fund for purchase of outstanding bonds and holdings of company. City assumes indebtedness of \$20,000 bond issue and pays Forest Dale corporation \$15,000 in cash for its properties.

Tappanish, Wash.—Bonds in sum of \$30,000 will be voted shortly for extensions to local water system.

Hull, Que.—Bids will shortly be asked by Council for pipe needed in extensions of water mains. Cost, \$14,330.

CONTRACTS AWARDED.

El Monte, Cal.—For furnishing pump to Smith-Booth-Usher Co., at \$1,840. R. L. Wood is City Engr.

Winfield, Ia.—For constructing water works to Des Moines Bridge & Iron Co., Des Moines. Edwin P. Anderson is City Clk.

Arkansas City, Kan.—Ten bids were received on furnishing of material and construction of water works improvements for Arkansas City, Kan., covering installation of two 2,000,000-gallon pumping engines, reconstructing of power house, elevated tower and tank and about 14 miles of extensions. Following bids were received: The Arrow Engineering Co., 412 Star Bldg., St. Louis, \$86,816.40. (This bid was lowest and was accepted. It covered use of Canton-Hughes pump, Chicago Bridge & Iron Works tower and tank, Columbian hydrants and valves and cast-iron mains for distribution.) T. C. Brooks & Sons, Jackson, Mich., \$86,991; Eby Construction Co., Wellington, Kan., \$88,601.35; Katz Construction Co., Omaha, Neb., \$88,880; Jas. Staunton, Leavenworth, Kan., \$89,500; N. S. Sherman Machine & Iron Works, Oklahoma City, \$90,990; Commercial Construction Co., Kansas City, Mo., \$91,500; Texas Construction Co., San Antonio, Tex., \$91,586; Public Service Construction Co., Omaha, Neb., \$93,000; Everett & Burt, Hutchinson, Kan., \$93,200. Bonds voted for improvements were \$97,897.65. Burns & McDonnell, Designing & Supervising Engrs.

Topeka, Kan.—For laying 5,230 ft. 4 and 6-in. water mains by City Comm., to Gustafson & Co., Topeka, at \$4,381.

Greensboro, Md.—For constructing water system, to E. J. Jones & Co., Dover, Del., at \$15,475.

Dalton, Mass.—Dalton fire district, through Water Commissioners, has awarded to David Dwyer contract to lay new water mains from reservoirs on North Mountain, at junction of North and Main Sts. Distance is about two miles and pipe to be laid will be of 14 and 12 in. in diameter. Cost will be about \$9,000, and work, which is the first of improvements in system for which district in special meeting recently held, was authorized to borrow sum not to exceed \$200,000, will be started as soon as possible. Other parties who put in bids for work were Ford & Parker and W. R. Pratt.

Framingham, Mass.—To Hanscom Constr. Co., Boston, contract for laying about 9,744 lin. ft. 12-in. cast-iron pipe at Framingham. Frank W. Meserve is chairman sewer com.; J. J. Van Valkenburgh is engineer.

Grand Rapids, Mich.—To Verhey & Klotte at \$3,397 for water mains in Milton and other streets.

Marble, Minn.—To Michael Boylan, Virginia, for installing sewer and water mains at \$7,000.

Kansas City, Mo.—To Badger Meter Mfg. Co., of Milwaukee, Wis., contract for furnishing 2,500 meters.

Kansas City, Mo.—Following contracts have been awarded: For furnishing yearly supplies and materials, General Chemical Co., Chicago, 94 cts. per 100 lb. for aluminum sulphate; cost per year about \$25,000; Brockett Cement Co., 22½ cts. bu. for lime; cost about \$4,000 per year.

Niagara Falls, N. Y.—By Water Board, to Shepard & Callahan, six contracts for laying over \$40,000 worth of new mains. Successful bidders were \$4,417.20

lower than their nearest competitors on all six contracts. Mr. Callahan said work would be started about Aug. 10, and that between 700 and 1,000 ft. of main would be laid a day.

Niagara Falls, N. Y.—The Ludlow Valve Mfg. Co., of New York City, has been awarded contract for 82 hydrants at its bid of \$2,439.50. The Rensselaer Co., of New York, was awarded contract for 201 valves at its bid of \$2,696.15.

Carrington, N. D.—For extending water and sewer systems, to G. W. Haggart Construction Co., Fargo, at \$14,875, for laying water mains, and \$12,599 for laying sewer pipe. H. L. Winterer is City Aud.

Beaver, Pa.—Contract has been awarded to the National Water Main Cleaning Co. of New York City for cleaning water mains in this city.

Philadelphia, Pa.—West Philadelphia's water supply, provided by Belmont pumping station, will be doubled by new equipment, for which contracts aggregating nearly \$200,000 have been let by Director Cooke, of department of public works. Two centrifugal pumps of 20,000,000 gallons' daily capacity will be installed to replace two 10,000,000-gallon reciprocal pumps. The new pumps will be furnished by Drave-Doyle Co., of Trenton, for \$79,750. Six vertical water tube boilers of 500 horsepower each will replace five boilers of 500 horsepower each and will be furnished by the Wickes Boiler Co. Other contracts, including piping, let to William Anderson, of Philadelphia, for \$20,450; blast fans and turbines, Kerr Turbine Co., at \$3,188; small pumps, Earle Gear & Machine Co., at \$5,800; water-softening tanks, John H. Baizley, at \$5,673; hydraulic lift, Robert Wetherill & Co., at \$2,232.

Richland, Pa.—To U. S. C. I. Pipe & Fdry. Co. for furnishing 165 tons of 6 and 8-in. c. i. pipe at \$21 per ton.

Woonsocket, R. I.—F. A. Houdlett, of Boston, representing the Warren Foundry Machinery Co., of Phillipsburg, N. J., has been awarded contract to furnish water pipe to city for \$21.75 per ton.

Humboldt, S. D.—To Des Moines Bridge & Iron Co., Des Moines, Ia., at \$9,389, for installation of waterworks, consisting of tank and tower, distribution system, engine house, pumping machinery, etc.

Wheeling, W. Va.—To Fleming & Co., of Pittsburgh, Pa., for rebuilding of settling tank of Benwood & McMechen Water Co., at pumping station.

Niagara Falls, Ont., Can.—Stamford Council has accepted bid of C. Gonder, of this city, on construction of foundation for water works standpipe at \$725. Standpipe is to be constructed in Lundy's Lane, near Victoria St.

Kildonan West, Man.—For construction of water mains on Main St., Jefferson Ave. and Scotia St., at \$42,459 to Dominion Construction Co., and for mains on several other streets to Thos. Jackson & Son at \$20,878.

LIGHTING AND POWER

Bridgeport, Conn.—Installation of "great white way" in center of city is being planned.

Fort Meade, Fla.—Bond election will be held August 21 for voting on \$25,500 for purchase of construction of electric lighting plant.

Canton, Ga.—Bonds in sum of \$5,000 have been voted for construction of a municipal electric light plant.

Waukegan, Ill.—City will receive bids for installation of ornamental lighting system until 8 p. m. Aug. 11, 1914. Specifications may be obtainable from Mayor J. F. Bidingger. Work includes 148 cast-iron ornamental 5-light cluster poles. M. J. Douthitt is City Engr.

Arma, Kan.—Election for light and water plant has been carried.

Belleville, Kan.—Installation of "white way" is being considered.

Paris, Ky.—Movement is on foot for a "great white way" in this city.

Cumberland, Md.—Plans for "white way" on Baltimore St. are being discussed.

Eveleth, Minn.—City Council has accepted offer from Home Electric & Heating Co. to transfer its plant to city at figure fixed by appraisers, \$134,655.05, provided that voters approve bond issue for the purpose.

Perth Amboy, N. J.—City Surveyor Samuel J. Mason will prepare estimate for cost of municipal electrical plant in this city.

High Point, N. C.—Installation of "white way" is being discussed.

Winston-Salem, N. C.—The matter of improving lighting condition of city will be presented to Board of Aldermen.

Girard, O.—Enterprising business men of Girard are behind lighting scheme which will likely result in business section of that village being lighted up like real White Way. Canvass of property owners has been made and majority have signed petition favoring erection of ornamental standards and installation of clusters of Tungsten lights. Standards and lights will be installed by property owners providing village provides power for lighting.

Norwalk, O.—Installation of municipal lighting plant has been authorized.

Youngstown, O.—Municipal lighting and power plant at Milton dam is recommended.

Nehalem, Ore.—Bonds have been voted for building of electric light plant.

Walhalla, S. C.—Citizens have voted \$60,000 bonds for constructing light plant. Bids are desired at once. W. M. Brown is Mayor. W. C. Hughes, Walhalla, is Engr.

Walterboro, S. C.—Election may shortly be held to vote on issuing bonds for electric light plant.

Winnsboro, S. C.—Citizens are discussing \$100,000 bond issue for repair of electric light plant and waterworks system.

Kalama, Wash.—City is having estimates made for construction of semi-municipal light and power plant.

Superior, Wis.—As result of negotiations pending between City Commission and Superior Water, Light & Power Co., it is probable that 275 additional street lights will be installed next year.

CONTRACTS AWARDED.

Punta Gorda, Fla.—For installing electric light plant to P. E. Fansler, St. Petersburg, at \$3,995. J. L. Corbett is Clerk Board Trustees.

Tarentum, Pa.—By Borough Council for constructing reinforced concrete power house to J. W. Walsh, Pittsburgh. Leo Hudson is Consulting Engr., 1210 House Bldg., Pittsburgh, Pa.

Chattanooga, Tenn.—On recommendation of Commissioner Warner, of department of public utilities, grounds and buildings, Board of Commissioners has accepted bid of Chattanooga Railway & Light Co. for lighting city streets for next five years. Bids were submitted for several kinds of lights, embracing 500-watt luminous arcs, the kind now being used on the "great white way," for which bids were submitted for \$45 each, the price now being paid; 400 to 425-watt series arcs; 500-watt flaming arcs, and the Mazda series of incandescents in 50, 100 and 200 watts, and also in 40, 100, 200 and 250 candlepower. Bids were submitted for maximum and minimum numbers for one, two, three, four and five years. Maximum and minimum costs of Mazda series are as follows: For one year the 50-watt, 40-candlepower lights, 300 or less, \$20.85; for 100 or more, \$20.60. For five years the minimum number would be \$18.25, and for the maximum number \$18. For one year the cost of the 100-watt, 100-candlepower Mazdas, 300 or less, \$24.24, 1,000 or more, \$23.99. For a term of 5 years the cost would be \$21 for the minimum number and \$20.75 for the maximum number. For one year the 200-watt, 200-candlepower lights, 300 or less, would cost \$30.24; 1,000 or more, \$29.99. For a term of five years the cost would be \$27 for 300 or less and \$26.75 for 1,000 or more. The nitrogen-filled lights, which are yet to be tested for the benefit of the Board of Commissioners, are quoted at a slightly less figure than the vacuum lights. For a period of five years the 60-candlepower lights are quoted at \$17.50 minimum and \$17.25 maximum; 80-candlepower, \$19 minimum and \$18.75 maximum; 100-candlepower, \$20 minimum and \$19.75 maximum; 250-candlepower, \$26.50 minimum and \$26.25 maximum.

FIRE EQUIPMENT

Eufaula, Ala.—City council is considering purchase of automobile fire truck for Eufaula department.

Crystal Lake, Ill.—Purchase of motor combination chemical and hose wagon and installation of alarm system is being considered. P. W. Rauhut is President Village Board; Paul Betram is Chief.

Delphi, Ind.—City Council has voted to purchase a new motor fire truck.

Fort Wayne, Ind.—Board of Safety has adopted resolution requesting Board of Works to include in its annual budget item of \$8,000 for construction of new house for installation of fire signal apparatus and another for \$7,000 for construction of new fire house in the Tenth ward.

Indianapolis, Ind.—Plans for enlarging and improving fire department at cost of \$100,000 have been outlined by board of safety. Ordinance authorizing bond issue of \$100,000 to be used in work will be submitted to city council. It is planned to erect two new fire engine houses.

Baltimore, Md.—With \$1,000 donated by Baltimore County Commissioners, the Hamilton Volunteer Fire Department is preparing to try to add \$2,000 more to it and purchase new automobile apparatus.

Salem, Mass.—City Council has ordered purchase of new six-cylinder motor pumping fire engine and appropriated \$8,500 for it. Council has voted appropriation of \$4,000 to replace damaged or destroyed equipment of out-of-town fire companies.

Flint, Mich.—Purchases of new equipment for fire department of probable total cost of more than \$1,000 have been authorized by Common Council on recommendation of Alderman W. H. McKeighan. Chief Price was also authorized to purchase from Sewell Cushion Wheel Co. a set of cushion wheels equipped with six Goodyear tires for pumping engine at Central station at cost of \$850.

Grand Rapids, Mich.—Board of Police and Fire Commissioners have voted to purchase new automobile supply wagon for fire department. Chassis will be secured from Parcel Post Equipment Co., this city, at cost of \$2,390.

Butte, Mont.—Fire Committee will purchase 2,000 ft. of 2½-in. and 600 ft. of 3-in. hose. Peter Sanger is Chief.

Glassboro, N. J.—Township Committee has made appropriation for purchase of motor combination chemical and hose wagon.

Elizabeth, N. J.—Fire department bonds in sum of \$38,500 will be sold by City Comptroller Sauer.

Hoboken, N. J.—Board of Governors of North Hudson Hospital is securing estimates for installation of alarm system.

Greenport, N. Y.—Funds are being raised for installation of fire alarm system.

Asheville, N. C.—Fire committee of Board of Aldermen, A. G. Barnett, chairman, has recommended to Board of Aldermen that another motor-propeller truck be purchased for fire department, this truck to replace present hook and ladder wagon which is carried as trailer. Recommendation was adopted and truck ordered from Seagrave company of Columbus, O.

Bellevue, O.—City will have fire alarm and police telephone service installed.

Chester, Pa.—Loan of \$75,000 has been authorized, of which \$5,000 is for fire apparatus.

Indiana, Pa.—At election to be held in November, proposition to issue bonds for \$5,000 for purchase of motor combination chemical and hose wagon will be submitted.

Northumberland, Pa.—Funds are being raised for purchase of motor combination chemical and hose wagon for Fire Co. No. 1.

Philadelphia, Pa.—New fire hose will shortly be provided, as the result of controversy between Director Porter and Chairman Connelly of Finance Committee. Director Loeb has announced that he will advertise next week for hose, and about \$15,000 will be expended. It is expected that about 17,000 or 18,000 feet of 2½-inch fire hose will be purchased.

Philadelphia, Pa.—Plans have been prepared for erection of new fire station and police building to cost \$125,000.

Somerset, Pa.—At meeting of Somerset Council it was decided to purchase auto truck for Somerset Fire Co., and a car put out by American-LaFrance Co. was selected at cost of \$5,700.

South Bethlehem, Pa.—Proposition of telephone company in regard to installation of fire alarm system has been favorably considered, and fire committee instructed to secure bids for necessary material.

Providence, R. I.—It has been voted at annual meeting of Watch Hill Fire District to purchase motor fire truck at a cost of \$1,500.

Hampton, Va.—Hampton City Council has decided to defer proposition of motorizing Hampton Fire Department until August session.

Newport News, Va.—Motorizing of fire department is being considered.

CONTRACTS AWARDED:

Joliet, Ill.—To Robinson Fire App. Mfg. Co. of St. Louis, Mo., for motor triple combination wagon at \$9,250.

Muskegon Heights, Mich.—To Manhattan Rubber and Boston Woven Hose & Rubber companies for 500 ft. of hose, at 66c. and 70c.

Kittanning, Pa.—By Borough Council, for 1,500 ft. of new fire hose, to J. & H. Phillips Co., of Pittsburgh.

BRIDGES

Sacramento, Cal.—Bond election to raise \$2,425,000 for construction of 271.55 miles of highways and 64 bridges in Sacramento County will be called by Board of Supervisors following reading of report of Sacramento County Highway Commission, designating the roads.

Sterling, Ill.—Plans and specifications for two new iron bridges for Harmon Township have been submitted by State Highway Commission to county. The two bridges that are in vogue are the Kimball and the Clatworthy.

Keokuk, Ia.—Plans for the new bridge over French Creek at Arch St. have been approved.

Keokuk, Ia.—Work of reconstructing Keokuk and Hamilton bridge will commence just as soon as specifications can be prepared, and contracts subsequently let, is statement of Theodore Gilman, of New York, secretary of Keokuk and Hamilton Bridge Co.

Louisville, Ky.—Plans for a new concrete bridge across Beargrass creek at Dupuy St. to cost about \$10,000 have been approved by Board of Public Works and bids will be taken July 31. Plans have been prepared under the direction of First Assistant City Engineer Burks.

Joplin, Mo.—It is probable that a movement will be started towards viaduct to be constructed over Kansas City Southern and Frisco tracks where they cross East Seventh St.

Perth Amboy, N. J.—Bids have been received for erection of bridge over Convery Place, Perth Amboy. H. W. Schrimpf, of Perth Amboy, was lowest bidder, his estimate being \$33,679. It is likely that he will be awarded the contract. Following are the bids: Lovering & Arriges, of Dunellen, \$39,985; Stillman, Belhanty & Ferro Co., New York, \$35,600; Ferro Concrete Co., Harrisburg, Pa., \$38,677; Alfred Sauerbrum, O. R. Graham, Jr., R. S. Cleaves, New York, \$41,283; H. W. Schrimpf, Perth Amboy, \$33,679; Penna. Bridge Co., Beaver Falls, Pa., \$41,965; Connors Bros. Co., New York, \$38,800; W. P. Porterfeld Co., New York, \$40,695; John W. Heller, Newark, \$43,500; Abraham Helin, New Brunswick, \$41,063; F. W. Schwies, Jr., Co., New York, \$40,605; J. C. Fowler, Perth Amboy, \$33,847; Meagher & Smith, Perth Amboy, \$34,000.

Portland, Ore.—With decision from Supreme Court upholding validity of Multnomah County's issue of \$1,250,000 interstate bridge bonds next step toward construction of this viaduct will be advertising of these bonds for sale.

Chester, Pa.—County Commissioners have awarded contract for two bridges. One of these is to be erected at Laughhead Ave., near Immaculate Heart Cemetery, near Linwood, and was awarded to Waterson & Son, of Philadelphia, for \$405. James Skelley was given contract for bridge over west branch of Chester Creek, near Chester Heights, for \$1,844. Other bidders included: A. L. Flounders, Media, \$2,105; Ernest Palmer, \$2,849; Waterson & Son, Philadelphia, \$3,135; Cantrell Construction Co., \$2,490.

Ford City, Pa.—Bonds in connection with construction of new bridge over Allegheny River at Ford City will be placed on sale by County Commissioners on Aug. 1, 1914. Bond issue calls for \$60,000.

Pittsburgh, Pa.—County Engineer J. G. Chalfant has been instructed on July 10th by County Commissioners to prepare plans for new bridge which is to stretch from McKees Rocks to lower North Side. Construction of this new span will cost about \$1,750,000.

Corpus Christi, Tex.—County Commissioners' Court of Nueces has accepted plans submitted by Engineers Barlett and Ranney of San Antonio for construction of causeway across Nueces Bay to connect the mainlands of Nueces and San Patricio counties. Bid for construction will be received August 17. Nueces county recently voted \$165,000 for building of this causeway, and San Patricio county has voted \$50,000 for building approach in that county. County expects to have causeway completed by next March. Special act of last legislature authorizes construction.

Lampasas, Tex.—Election was held in Lampasas County July 18 to determine whether or not county should issue bonds to amount of \$14,000 to build four bridges in county. Returns received give majority of 124 in favor of issuance of bonds.

Lynchburg, Va.—Resolution approving tentative plans for proposed viaduct over James River, from Seventh and Commerce Sts., together with appointment of commission to supervise construction, has been concurred in by Common Council.

Lynchburg, Va.—Board of Aldermen has approved plans for construction of mammoth bridge over yards of three local railways and James river from 7th and Commerce Sts. Railways are to build bridge and city will contribute sum of \$50,000 to its cost, which will be approximately \$300,000.

CONTRACTS AWARDED.

Batesville, Ark.—For constructing concrete bridge to Hanford & Pugett, Batesville, at \$3,489; also Memphis Bridge Co. secured contract for 2 steel bridges. J. W. Scott is Co. Judge.

Phoenix, Ariz.—Bids for construction of new bridges over Maricopa and Salt River valley canals on state highway between this city and Tempe have been opened by Board of Supervisors and bid of Martin & Gillis of \$1,700 was accepted.

Vincennes, Ind.—Commissioners have sold eleven bridges, six of them going to Vincennes Bridge Co. The Vincennes Bridge got following: Apraw, \$594; Jett, \$300; Levey, \$1,641; Goggins, \$675; Downey, \$444; Rafferty, \$450. James Hopkins got the Dages, \$659; Madden, \$400; Ryan, \$206; Gallagher, \$447. Dan Kutter got Godwin bridge on bid of \$1,119.

Leavenworth, Kan.—County commissioners has let three contracts for construction of bridges in county, Missouri Valley being lowest bidder in one case while other two went to Leavenworth Bridge Co. Behler bridge went to former at \$1,189, while Wells bridge at \$894 and Walnut bridge at \$1,165 went to Leavenworth Bridge Co.

Elizabeth, N. J.—Three contracts for county work have been awarded by committees of Board of Freeholders. John L. Bachman, of Linden, Riley Brothers, of Newark, and the Schuler Cement Construction Co. were successful bidders. Work awarded to Mr. Bachman is erection of bridge at Cranford and Union Aves., Linden. His proposal of \$956 was the lowest received. The others were as follows: Charles Lantz, \$1,102.60; E. L. Moore, \$1,193; James Moran, \$1,173; Charles A. Peterson, \$1,092; Riley Brothers, \$968; Schuler Cement Construction Co., \$1,226; C. G. Winans Co., \$1,094; Logan Construction Co., \$1,250; Villa Brothers, \$975. Riley Brothers' bid of \$830 was the lowest for the erection of a bridge in Frank street, near 12th Ave., Roselle. Other bidders and their estimates were: Isadore Bass, \$1,095; Schuler Cement Construction Co., \$1,018; E. L. Moore, \$1,017; Logan Construction Co., \$1,093; Charles Lantz, \$974.10; C. H. Winans, \$882; Villa Brothers, \$885; C. A. Peterson, \$881. The Schuler Cement Construction Co. bid \$849 for the construction of a bridge in Passaic Ave., Summit. The other proposals received were as follows: Camelleo Massa, \$1,325; C. A. Peterson, \$1,178; Villa Brothers, \$995; F. W. Helms, \$1,458; A. L. Wright, \$1,836; W. L. Oakes & Co., \$1,450; M. Fanno, \$950; Joseph Matteo, \$1,012; Logan Construction Co., \$1,039; Post & Cogshall Co., \$1,035.

Amsterdam, N. Y.—Eight bids have been received by State Superintendent of Public Works Duncan W. Peck for construction of proposed bridge across canalized Mohawk River in this city. These bids were opened in office of Mr. Peck, and showed that only two were under estimated cost of \$53,000. While no official canvass of proposals have been made, unofficial canvass indicates that Lathrop, Shea & Henwood Co., of Buffalo, is lowest bidder, its proposal being approximately \$147,408. Other bids are as follows: Penn Bridge Co., Beaver Falls, Pa., \$164,568; Frank L. Cohen, Buffalo, \$152,548; Larkin & Sangster, Seneca Falls, \$163,463; John M. Holler, Albany, \$157,604; Eastover Construction Co., Gloversville, \$192,635; Lupfer & Remick, Buffalo, \$158,093; Walsh Construction Co., Davenport, Ia., \$159,462. It is expected contract will be awarded in a few days.

Piqua, O.—County Commissioners have awarded contract for Millcreek bridge to E. W. Yount, at \$939, estimate being \$1,292. Bidders were: Union Construc-